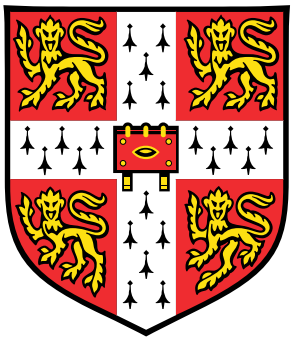
Conservation and resilience to drought: a social-ecological perspective on conservation areas in Kenya's Southern Maasailand



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Declaration

I hereby declare that, except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This dissertation is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and acknowledgements. This dissertation contains fewer than 80,000 words and does not exceed the prescribed word limit for the Earth Sciences and Geography Degree Committee.

Peadar Brehony
November 2020

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Peadar Brehony

Abstract

English

This thesis aims to elucidate the complex and important ways in which community conservation areas in Kenya's Southern Maasailand interplay with resilience to drought.

Using a social-ecological systems perspective and a resilience lens, this thesis makes use of data from quantitative and qualitative methods, including a household survey, semi-structured interviews, document analysis, and remote sensing to investigate two group ranches in Kenya's semi-arid South Rift, Olkiramatian and Shompole. These communities have chosen to establish conservation areas on a significant portion of their land, and they have experienced two severe droughts over the last decade.

This thesis explores the historical context of livelihoods, droughts, and land tenure in Olkiramatian and Shompole, as well as the provenance of their conservation areas. Research findings show that the conservation areas were established in drought grazing refuges, and that these areas continue to be used in that way today.

In examining processes of adaptive governance over recent droughts, this thesis also shows how the current constitution of natural resource governance institutions, and the ways in which they are given authority, have resulted in adaptive systems which are considered to be legitimate, participatory, and effective at mediating complexity and uncertainty.

This thesis also revealed that although the social-ecological systems are changing, current land management systems appear to be maximising resources while maintaining local resilience for people, livestock, and wildlife. This research finds that although contestations exist, some of the benefits of conservation areas appear to be reaching poorer households, and that for most households, conservation areas did not make things worse during recent droughts. However, conflict with wildlife remains a significant cost.

In collating these results, this thesis highlights that when there is strong local ownership, with effective governance which prioritises culturally and economically important livelihoods, conservation areas can be helpful in maintaining social-ecological resilience to drought.

Swahili

Lengo la utafiti huu ni kuonyesha na kufafanua njia tofauti na ngumu ambazo maeneo ya uhifadhi wa jamii katika Kusini wa Maasailand ya Kenya yanaingiliana na uthabiti wa ukame.

Kwa kutumia utafiti wa mifumo ya ikolojia-mazingira ya kijamii (social-ecological systems perspective) na kuona uthabiti wa watu na mazingira, utafiti huu umetokea katika ranchi mbili za vikundi katika eneo kavu la Kenya Kusini, yaani Olkiramatian na Shompole. Utafiti hutumia takwimu na taarifa kwa njia ya uchunguzi wa kaya, mahojiano, uchambuzi wa hati, na kuchunguza eneo kwa kutumia pitcha za setilaiti. Jamii hizi za Olkiramatian na Shompole zimeamua kuanzisha maeneo ya uhifadhi katika sehemu kubwa ya ardhi yao. Ukame kali umekwisha tokea mara mbili kwenye eneo hizi tangu mwaka elfu mbili na nane.

Utafiti huu unachunguza muktadha wa kihistoria jinsi watu wanavyojitegemea, ukame, na umiliki wa ardhi huko Olkiramatian na Shompole, na pia historia ya uhifadhi huu. Matokeo ya utafiti yanaonyesha kwamba maeneo ya uhifadhi yalianzishwa katika maeneo ya malisho kwa wakati wa ukame, na kwamba maeneo haya yanaendelea kutumiwa kwa njia hiyo mpaka leo.

Katika uchunguzi wa michakato ya utawala wakati wa ukame wa hivi karibuni, utafiti huu umeonyesha jinsi muundo wa taasisi za maliasili, na njia ambazo zimepewa mamlaka, zimesababisha mifumo inayofaa na ambayo inachukuliwa kuwa halali, shirikishi, na yenye ufanisi kwenye kupatanisha mambo ambayo ni mguma, yenye matata na hana uhakika ya kutatuliwa.

Utafiti huu umeonyesha kwamba ingawa mifumo ya ikolojia-mazingira ya kijamii imebadilika, mifumo ya sasa ya usimamizi wa ardhi inaonekana kuongeza rasilimali wakati wa kudumisha uthabiti wa eneo kwa watu, mifugo, na wanyamapori. Utafiti huu umegundua kuwa ingawa mashindano yapo, faida zingine za maeneo ya uhifadhi zinaonekana kufikia kaya maskini, na kwamba kwa kaya nyingi, maeneo ya uhifadhi hayakufanya mambo kuwa mabaya wakati wa ukame wa hivi karibuni. Walakini, migogoro na wanyamapori bado inaendelea na inaleta hasara kubwa kwa jamii.

Katika kukusanya matokeo haya, utafiti huu unadhihirisha kwamba kama jamii wakisikia kwamba eneo hili ni la kwao na kama kuna utawala bora ambao unapewa kipaumbele katika maisha muhimu ya kitamaduni na kiuchumi, maeneo ya uhifadhi yanaweza kusaidia katika kudumisha uthabiti wa kijamii na ikolojia kwa ukame.

Maa

Ore enkipirrta ena jurrore naa peyie eitodolu, neitalalau inkoitoi naapaasha naagol naadimie eramatata oormareita, lenkaji e Maa ootii Kopikop olosho le Kenya, meimai ilameitin.

Ore epuoi aasishore enjurrore oompukunot eramatare ormanyara, nkoitoi naatii oloing'ang'e, nedoli nkidimat ooltung'ana tenebo ormanyara, ore ena jurrore, netupukuo too muruan are naatii orpurkel le Kopikop olosho le Kenya aa taa Olkiramatian tenebo oo Shompole. Ore ena enjurrore naa keasishore nkoitoi naapaasha tenebo esotunoto oorkiliku enjurrore nadede oormareita, enkitamaayare oltung'ani obo makeon, enjurrore oombukui naaigeroki tenebo nkoitoi naatii oloing'ang'e. Ore kuna muruan pokira aa Olkiramatian oo Shompole, netumuta apa nabo aaiteru ilaleta ooramatieki ing'uesin, tiaatua erubata sapuk enkop enye. Eidipa aataasata ilameitin oare sapukin ooirowua aiteru tolari loo nkalusuni-are oo isiet.

Ore ena jurrore naa kelo akekenu too nkaatini nkoitoi naaidim iltung'ana aatanapate, ilameitin, tenebo enjung'ore enkop teidie tolkiramatian tenebo oo Shompole, tenebo sii enkatini eramatare eina kop. Ore irkiliku ootushukuo ena jurrore, neitodolua nchere ore ilolo aleta oogirae aaramatie ing'uesin entim, naa iwuejitin apa neetekeraki pee eaku indaat oo ntokiting' toonkatitin olameyu, neton ake egirae aasishore inana oitoi tenakata.

Ore tenjurrore orbakunei oipirrta erikore toonkatitin olameyu oshi-det, eitodolua ena jurrore eneiko mbarakinot naatipiki peyie eitasheiki ormanyara tenebo onkoitoi naaishooki ina rikore engolon, neshomoita aaishoru inkoitoi naanare, naa naagirae

aaya toosipat. Ore nena barakinot neyautua erikore nayiolo sirkali, neitegel iloopeny emuruan nkoitoi enkitutumore naatii esipata naitutumieki inkoitoi naagol nemeidimayu, naa kegol epuoi aapik ndung'eta enkidipata.

Eitedolua ena jurrore nchere ore hoo duoo neibelekenyate mpukunot eramatare telalai, ore rishat ena kata erikore enkop, neitodolua emponaroto oo nkishoorot Enkai, eitudupari oleng' enkibung'ata oo wuejitin oo loopeny, tooltung'ana tenebo ong'uesin entim. Ore ena jurrore neitisipua nchere, ore hoo duoo naa aisapuk enkesha, ore irmareita kumok menat, netabaikia dupoto e kulo aleta leramatata oo ng'uesin. Ore kulo aleta leramatare oo ng'uesin neitu einyial imbaa toonkatitin olameitin likibayie oshi det. Kake ore ake-eyia, ore ilarrabali loo ng'uesin entim, neton ake eloito dukuya egira aayau enkitadoyioroto sapuk oo masaa tiaatua irmareita.

Ore tesotunoto e kulo kiliku, neitodolua ena jurrore nchere, tenening' irmareita aajo ore ena murua naa enenye, naa tenetii erikore nadede enkop, naa ninye eiturukieki tenebo imbaa orkuaak, ore kulo aleta leramatata oo ng'uesin naa keidim aataa eretoto naidimie ninche aaitudupaa nkidimat oo lameitin.

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During my field work, Daudi Ntetiyian Ole Pasoi said to me, *"Metoriko intae Enkai, neutaki intae kulie wuejitin sidan"* ("If you are not thankful for small things, you won't be thankful for big things").

I must begin by thanking my supervisors who helped me in both big and small ways. Thank you Nigel Leader-Williams for your advice and help all along, you always welcomed me into your office, even when you knew it wasn't going to be "just 5 mins". Thank you Bill Adams for stepping in when you were needed, and inspiring and guiding me through the trials and tribulations of writing up. Both of you have given me critical support which has been crucial in enabling me to get this far.

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Thank you too to all my friends who work out of the Lale'enok Resource Centre. When I wasn't working, I was probably chatting with my good friends Oloimbia, Joel, Benja, Patrick, Koike, Marakiti, Parsaloi, Silvia, and many others! Thank you too to those who hosted me in their own homestead, your hospitality will always be remembered.

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Now I just hope Ole Tanju was right when he laughed at me saying, *"Basi, mi na fikiri uki chukua hio maoni kwa shule, eehhh, utapata degree"* ("So, I think if you take those comments to your college, you'll get a degree").

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Abbreviations and Glossary

Abbreviations

ACC - African Conservation Centre

AIC - Akaike Information Criterion

AoV - Art of Ventures

AWF - African Wildlife Foundation

BIC - Bayesian Information Criterion

CBC - Community Based Conservation

CDF - Constituency Development Fund

CDTF - European Union's Community Development Trust Fund

CHIRPS - Climate Hazards Group InfraRed Precipitation with Station data

CI - Confidence Intervals

DRSRS - Department of Resource Surveys and Remote Sensing of Kenya

EU - European Union

EVI - Enhanced Vegetation Index, see formula 6.1 for details

GEE - Google Earth Engine

GLM - Generalised Linear Model

GR - Group Ranch

HWC - Human-Wildlife Conflict

ICIPE - International Centre for Insect Physiology and Ecology

KSh - Kenyan Shillings. The exchange rate used in this thesis is based on the 28^{th} of February 2020 when 100 KSh = 1 US$.

KWS - Kenya Wildlife Service

MCA - Member of the County Assembly

MOL - Maa O Leng Limited, a company jointly owned by Shompole Group Ranch and Art of Ventures

MP	- Member of Parliament
MRTC	- Maasai Rural Training Centre
MSC	- Magadi Soda Company
NDVI	- Normalised Difference Vegetation Index
NEMA	- National Environment Management Authority, Kenya
NGO	- Non-Governmental Organisation
OSCDP	- Olkiramatian and Shompole Community Development Project
PCA	- Principal Component Analysis
SCIDP	- Shompole Community Integral Development Project
SORALO	- South Rift Association of Land Owners
SPFE	- Society for the Preservation of the Fauna of the Empire
TLU	- Tropical Livestock Unit
US$	- United States Dollar

Glossary

baraza - Kiswahili; literally council, used as council meeting

Batemi - Kiswahili; a cultivation based people who are sometimes referred to as the Sonjo

eleenore - Maa; grazing scouts

emanyata - Maa; settlement, sometimes for ceremonies, singular

emboot enkurma nanyokie - Maa; translated as season of the red flour (1943-1946), see Table 4.1

emboot enkurma sikitoi - Maa; translated as season of the yellow flour (1959-1962), see Table 4.1

emurata e kedianye - Maa; right hand half age group

emurata e tatene - Maa; left hand half age group

emutai - Maa; literally disaster. In reference to a period in the late 1880s and 1890s when there were a succession of disasters across Maasailand

enkang - Maa; homestead

ilaiguenak loonkishu - Maa; spokesmen, councillor of age set, plural

ilaiguenak loonkraoni - Maa; spokesman of the cattle (of the people)

ilaiguenak - Maa; general term for spokesman, councillor, plural

Ildamat - Maa; Maasai olosho, or section

ilgilat - Maa; Clan

Ilkaputei - Maa; Maasai olosho, or section

Ilkeekonyokie - Maa; Maasai olosho, or section

ilkishiru - Maa; Maasai age set

ilkitoip - Maa; Maasai age set

Ilmatapato - Maa; Maasai olosho, or section

ilmurran - Maa; warrior, plural

ilnyankulo - Maa; Maasai age set

iloibonok - Maa; prophet, ritual expert, medicine man, spiritual leader (Mol 1996)

Iloitai - Maa; Maasai olosho, or section

Iloitayok - Maa; Maasai olosho, or section

Iloodokilani - Maa; Maasai olosho, or section

iloshon - Maa; Maasai sections, plural

ilpayiani - Maa; elder men, plural

ilporori - Maa; age group

ilpuli - Maa; meat camps where men eat meat and drink medicinal soups.

Ilpurko - Maa; Maasai olosho, or section

Ilsikirari - Maa; Maasai olosho, or section

imanyat - Maa; settlements, sometimes for ceremonies, plural

iseuri - Maa; Maasai age set

mpagazi - Kiswahili; caravan porter

Ndorobo - Maa; hunter-gatherers who speak Maa

nkraoni - Maa; shorthand for Adminstrative Chief

olaiguenani kitok - Maa; head spokesman, singular

olaiguenani lolaji - Maa; spokesman of age set, singular

olaiguenani loonkishu - Maa; spokesman, councillor of age set, singular

olaiguenani loonkraoni - Maa; literally spokesman of the crown (the government), used for Administrative Chief

olaiguenani - Maa; general term for spokesman, councillor, singular

olaji - Maa; age set comprised of both left and right-hand groups

olameyu loo loik - Maa; translated as drought of the bones (1933-1935), see Table 4.1

olameyu loo lonito - Maa; translated as drought of the hides (1925-1927), see Table 4.1

olameyu - Maa; aridity, lack of grass

olameyu - Maa; drought, lack of grazing

olmarei - Maa; household, singular, defined in Chapter 2.4 Methodology Household Survey. Plural form is *ilmareita*.

oloiboni - Maa; prophet, ritual expert, medicine man, spiritual leader (Mol 1996)

olopololi - Maa; grazing reserve

olosho - Maa; Maasai section, singular

olotuno - Maa; cultural role

olpayian - Maa; elder man, singular

olpiron - Maa; literally firestick, godfathers of a younger age set, plural

olporror - Maa; half an age set, also called age group

osotua - Maa; umbilical cord, kinship, close relationships, and peace

osupuko - Maa; highland grazing areas

wakwavi - Kiswahili; general term sometimes used for Maa-speaking agro-pastoralists

wangurumani - Kiswahili; general term sometimes used for people who live and cultivate in Nguruman, Kenya

Prologue

"Netii apa..." | The start of a story in Maa

"You know droughts can bring luck too," my friend Lomunyak[1] said.

"How," I asked?

"Well, Maasai believe that some people may be lucky enough to have calves born during a drought. The first calves born after a drought to cows that survived through a drought are called *nkishu lasho oo ndung'on*; those are special calves. They are strong, and with that special name, they always find a special place in our hearts. We also believe that once that calf becomes a cow and has five more calves, there will be another drought. But droughts are tough too," Lomunyak reminded me.

"You know, last month I gave away more than half my salary to my friends and neighbours, before I could even look after my own family. I have a job [at the resource centre which relies on income from researchers, tourists coming to visit the conservation area, and NGOs who use the centre as a base]. People come and ask for money when they know you have it. So we have to help them, they are our family, friends, and neighbours. Even some of our really wealthy neighbours, are generous. Like Nkoitiko Napidiya Ole Koshal. You know he had over 800 cows, over 2000 sheep and goats, and nine wives... He would often give people who needed some help a sheep, some maize flour, or even a cow sometimes! But that was before the drought [2017 drought]. The drought killed almost all his livestock. Many many. And then, worst of all, at the time that all his livestock were dying, he was getting a lift in a truck travelling to the market, and they had an accident. He was rushed to hospital, and they were able to help him, but he ended up with a bill of KSh 300,000 [around US $3,000]. Can you imagine! But when he had all his livestock, when he was rich, he was a very generous

[1]These names have all been changed, but the events are real.

man. Yet, he had no livestock to pay that bill. But, you know, that entire bill was paid for by those friends he helped before. Not only that, but now we are all giving him livestock, to say thank you, and to help him now. Last week I gave him a goat, and Olorishisho gave him a sheep. He has even been given 12 cows. So he is already rebuilding. . . "

That evening, after Lomunyak finished work, we headed off to his *enkang* [homestead]. I was setting up my tent beside his cows for the night, as I had to go to follow up with my research assistants about my household survey over the following few days, in an area close to his *enkang*.

We sat out as it got dark, and the intense heat of the day was replaced by a warm sunset breeze. We drank hot, milky, smoky, sweet tea, as we silently adjusted our eyes to the darkening landscape around us. The sheep and goats had come home earlier, but the cows were only just arriving back from their day of drinking and grazing by the river. Lomunyak's younger brother trailed behind the last cow. Whereas he was normally tired after a day of herding, today he was distressed. He came over to us, and didn't accept tea, but instead, he and Lomunyak spoke furiously in Maa, I couldn't follow everything they were saying. Lomunyak got on his phone and began short sharp conversations with people on the other end. Another call. Another call. Then he stopped. And leaning on his stick, he held his hand with his phone up to his forehead, and sighed. I tentatively asked him what was happening.

"A cow is missing."

"Gosh. What can we do?" I replied.

"Well, I've called all the herd owners of all the other cows that were drinking down by the river today, to see if my cow went home with them. But no," Lomunyak said, exasperated.

"So what can we do?" I asked helplessly.

"Well, let's go to all our neighbours to see if the cow went back to their *enkang* instead."

So off we set in the pitch black, occasionally using our phone torches to light the way over rocky patches. No sign of the cow at Oreteti's, or at Olorishisho's. When we got to Shokoine's, his first wife Nashipai informed us that he had gone out to pick up some water on his motorbike. Shokoine was Lomunyak's age-mate, close friend, and work colleague at the resource centre, so Nashipai invited us into their temporary house. They had slaughtered a sheep, as Shokoine's second wife Nonkishu wasn't feeling well,

so they wanted her to drink the fatty sheep broth that was their elixir. Nashipai insisted that we eat the special cut of meat that they always left aside for friends or unexpected visitors. We gladly ate, as we had not had dinner. A few minutes later Shokoine arrived back and carefully offloaded the yellow jerry cans full of water, to his kids, who quickly ran off to prepare their evening shower. Shokoine and Lomunyak discussed what had happened, they often herded their livestock together, but not today. Shokoine went around checking his herd, nothing. We walked home, our bellies satisfied, our hearts despondent.

The following morning, Lomunyak set off to the river, where his cow was last seen. By the time he got home, it was already getting dark. We sat down together, just outside his livestock enclosure. He began to recall his day.

He had asked everyone he could think of, and he heard that two other cows were missing, as well as a big bull. People suspected they were stolen, so maybe Lomunyak's cow was too. They called all their contacts in the main livestock markets in Kiserian, near Nairobi, and described the cows and bull to them, and told them to be vigilant for them. By the afternoon, they heard that the bull was sold earlier in the day, and was gone. They had not heard about the cows...

Lomunyak kept looking by the river. Finally, they found tracks, of hyaena. Lots of hyaena. They followed the tracks into the bush, and found some skin, and a skull, intact. His cow. They looked around more, and found lion tracks; big lion tracks; a few different lions. They followed those, and found drag marks, from down near the river, in a thick bush. Probably where the lions were sleeping out the heat of the day. The lions must have killed her, and the hyaenas finished her off.

"How could you not have heard all this commotion?" Lomunyak asked his younger brother.

He confessed that he was a bit further down the river washing and chatting with the other herders in the middle of the day, when it must have happened...

Lomunyak stopped talking, and stared blankly at his phone.

"*Pole*" [I feel sorry for you], I said.

An ostrich call, eerily similar to a distant lion, broke the silence.

Lomunyak said he was torn, he was upset, but he couldn't be too angry. He liked lions, he liked hearing them at night-time. His group of warriors were esteemed for killing lions many years ago. Today, that lion meant that researchers like me came, tourists came, and it meant he had a job. The same job that helped him buy that cow

two years ago, before the drought. The same job that meant his neighbours came to him during the drought for help. He was one of the lucky ones.

He got up, and walked out of the gap in the thorn fence of his *enkang*, picked up the big thorn bush that was his gate, and dragged it in behind him, into the gap, securing his fence.

Early the next day, I set off from Lomunyak's *enkang* to meet up with Sairowua, my research assistant, who was due to conduct my household survey in several homesteads nearby. At the end of another long hot day, we got to our fifth and final homestead: a widow, looking after five children. She had a nice house, with a store room, and a small herd of sheep and goat. She ran a modest shop in the small village centre a 30 minute walk away. At the end of the survey, we chatted for a bit. She was a widow because her husband left one day several years ago, to go look for work in Nairobi, but was never heard of since. Hers was one of the families who received education bursaries from the group ranch [ostensibly funded by revenue from the group ranch's conservation area], but she had to supplement her children's school fees with her own income. At the end of our chat she said:

"It's nice that you are a bit different. When others come to do research for their business, or come here just to take pictures of us, when they are finished, they just leave... Do you know if they make money from the research and the pictures?"

I hesitated to think, "Yes, it is possible that some people do, but also, that others don't."

"Well," she said, "I need to cook for the children."

So we thanked her and left. I asked myself how could I really make sure that I was different.

Introduction

The aim of this thesis is to investigate the ways in which community conservation areas in Kenya's Southern Maasailand interplay with social and ecological resilience to drought. In the arid and semi-arid rangelands of East Africa, various approaches to conservation are being implemented. There has been a push for more devolved forms of community-based conservation, yet there has been little research on how these two things, spatial droughts, and spatial conservation, might interplay. This thesis uses an interdisciplinary perspective to investigate this interplay in two community conservation areas in Olkiramatian and Shompole, in Kenya's Southern Maasailand, in an area known as the South Rift.

Populations of large wild animals have been slowly declining since the early 20$^{\text{th}}$ century in Africa (Craigie et al., 2010). Over the last 30 years, these declines have been precipitous in West Africa, and only slightly less severe in East Africa (Caro and Scholte, 2007; Craigie et al., 2010). Countries like Kenya, Tanzania, Ethiopia, and Rwanda in East Africa support rapidly expanding economies and a rapidly changing demographic trend. They also remain globally important biodiversity hotspots, particularly for charismatic large species (Ceballos and Ehrlich, 2006).

Historically, conservation interventions in East Africa focussed on protecting attractive large mammals and landscapes, at the expense of resident and migratory people (Adams, 2004; Brockington, 2002; Lindsay, 1987). More recently, conservation interventions have often sought to include local communities, recognising the important role they play in protecting and managing ecosystems (Western et al., 1994). The arid and semi-arid lands of Kenya and Tanzania support some of the richest large mammal populations on earth, through a network of community pastoral rangelands, national parks, and reserves (Tyrrell et al., 2020).

In recent years, East Africa has suffered several severe droughts (Nicholson, 2016; Rowell et al., 2015). Although droughts are a regular occurrence in East Africa's arid and semi-arid lands, they continue to have devastating effects on people and ecosystems. For instance, the recent 2017 drought in Kenya was declared a national humanitarian disaster with many people dying, or losing all their livestock wealth in a matter of months (Government of Kenya, 2017). Before this, the 2009 drought in Kenya also resulted in massive mortality of livestock and wild animals (Ogutu et al., 2014; Zwaagstra et al., 2010). These droughts should be understood in the context of significant social and ecological change in many of the arid and semi-arid grassland systems (Anderson and Bollig, 2016; Bollig, 2016; Homewood et al., 2019; Kaye-Zwiebel and King, 2014; Little et al., 2001; Vehrs, 2016).

The processes of social and ecological change in these arid and semi-arid lands, and the ability of communities to respond to drought, have implications for the future resilience of these systems. In this context, the role of community-based conservation interventions in affecting this resilience remains poorly understood. My aim in this thesis is therefore to investigate the extent to which spatial forms of community-based conservation are changing social-ecological resilience to drought. The study will focus on community conservation areas in Kenya's South Rift, Olkiramatian and Shompole, and the impact of two significant droughts in this area over the last decade, 2009 and 2017.

In the rest of this chapter I will look at pastoralism, including ongoing processes of marginalisation, and paths of diversification. I will then discuss the shifting debates in conservation, particularly community-based conservation, and the role this has played in Maasailand. I then look at changing droughts in the context of arid and semi-arid lands, and discuss what droughts can reveal in this context. To tackle the complex questions that cut across disciplines such as social sciences and ecology, requires an appropriate interdisciplinary theoretical perspective, and I will discuss why I have chosen a social-ecological systems perspective with a resilience lens. Finally, I will introduce my research questions, and the layout of this thesis.

1.1 Pastoralism, marginalisation, diversification

Pastoralism, based principally on an association between people and their domestic grazing animals, has allowed people to live in the arid and semi-arid rangelands of Africa for millennia (Collett, 1987; Homewood, 2008; Spear and Waller, 1993). These

areas support significant numbers of people in ecosystems where inter-annual rainfall regularly varies by more than 30% and ecological shocks are common (Hesse and MacGregor, 2006). Livestock grazing is the most viable land use type in arid and semi-arid lands as it allows for the extensive seasonal movements of livestock between dry and wet season grazing reserves. Livestock are critical to local livelihoods, food security, and local wealth generation, whilst also providing significant contributions towards national gross domestic product (Allegretti et al., 2016; Hesse and MacGregor, 2006; Molina-Flores et al., 2020).

Pastoralism combined with subsistence hunting and fishing, as a way of life, was present in East Africa at least 4,000 years ago (Marshall, 1990). East Africa's unique bimodal rainfall patterns, and the introduction of *Bos indicus* cattle breeds, provided optimal conditions for the emergence of a specialised, milk-based pastoralism in East Africa, between 3,000 to 2,000 years ago (ibid.). In Kenya today, 30% of the people and 70% of livestock are in arid and semi-arid rangelands, which cover 80% of the land mass (Odhiambo, 2013). Pastoralists in these areas are part of a complex, interdependent regional economy (Waller, 1993) and although culturally they remain dependent on their livestock, most pastoralist communities have diversified to include other forms of livelihood (Homewood, 2008; Homewood et al., 2009b). Two elements key to the success of pastoralism in arid and semi-arid rangelands are mobility of livestock, and social institutions for the management of resources, which allow people to capitalise on the highly variable rainfall patterns and cope with periodic but significant shocks, such as droughts (Butt et al., 2009).

Although pastoralists are fundamentally associated with domesticated grazing animals, as I have mentioned, it is also true that pastoralists are continuously shifting livelihoods according to changes in the social-ecological systems around them, whether changing climate, economic opportunities, politics and conflict, or disease (Waller, 1993). Therefore, when defining pastoralism, it is necessary to be aware of the much broader range of activities that this encompasses (see Homewood, 2008). In sum, for the purposes of this thesis, my definition of pastoralism (or pastoralist) encompasses not just those who are directly dependent on livelihoods thanks to their livestock, but in the broad sense, the entire system that is built around this people-livestock culture and economy (Homewood, 2008). This definition therefore encompasses: people who rely on livestock for their subsistence; agro-pastoralists for whom livestock is a vital component of their livelihood and culture; people whose business relies on livestock; people who have very few livestock, but for whom livestock represent an important

cultural identity and afford them social capital; finally, it also includes people for whom pastoralism is an important point of identity, even if not a reality (Shaughnessy, 2019).

In this thesis, I will focus on Maasai pastoralists living in southern Kenya. Maasai are a Maa speaking, milk-based, pastoral people who currently live in northern Tanzania, and southern Kenya. They are believed to have emerged as a distinct group of pastoralists from the area south of Lake Turkana, in northern Kenya, and then expanded their territory southwards, at least 300 years ago, by conquering, displacing, and assimilating other groups (Sutton, 1993).

1.1.1 Good pastoralists, bad pastoralists

Pastoralists are often held responsible for rangeland degradation and desertification. This blame is based on the premise that people interfere with the delicate equilibrium systems of arid and semi-arid rangelands, which when disturbed, can lead to collapse (United Nations Conference on Desertification, 1978; Wright, 2017a). Equilibrial thinking in rangelands implies that there is a measurable and constant carrying capacity, and that these systems would persist within a climate epoch, without people's influence (Lambin et al., 2001). Furthermore, Hardin's (1968) Tragedy of the Commons model was famously premised on the mismanagement of a pastoral commons that, as presented, inevitably resulted in degradation and misery. Such narratives were, in essence, the basis for the "received wisdom" narratives of degradation and overpopulation in Africa's arid and semi-arid rangelands. These narratives resulted in a push to shift from subsistence to commercial livestock management, from communal enterprises to privatisation, and from traditional institutions of land management, to "modern" ones (Leach and Mearns, 1998; Rohde et al., 2006).

This equilibrial understanding is now seen as poorly suited to explaining rangeland ecology where unpredictability dominates, and where systems approach non-equilibrium dynamics at certain scales (Behnke et al., 1993; Lambin et al., 2001; Linstädter et al., 2016; Niamir-Fuller, 1998). Therefore, these persistent narratives have been seriously contested by numerous scholars (Ellis and Swift, 1988; Homewood, 2004; Homewood and Rodgers, 1991; Lane and Moorehead, 1994; Leach and Mearns, 1998; Ostrom, 1990; Rohde et al., 2006; Sandford, 1983). These scholars, and others, have critically queried the foundations and general applicability of equilibrial thinking, the Tragedy of the Commons model, and the narratives of mismanagement and degradation of pastoralist managed arid and semi-arid rangelands, more generally.

A more balanced understanding of rangeland dynamics recognises the importance of an unpredictable climate, herbivory, and people's decision making, in determining vegetation production and composition (Sullivan and Rohde, 2002). Consequently, instead of these narratives, non-equilibrium models of much wider social and ecological systems are crucial in understanding arid and semi-arid rangelands. Here, the high spatial and temporal variability of rainfall results in a system where ungulates (e.g. livestock and/or wild animals) rarely reach a balance with grazing resources, and where periodic droughts can rapidly reduce animal numbers through death or migration. In these situations, adaptive governance and opportunistic pasture management by pastoralists becomes a vital strategy to maximise productivity (Abel and Blaikie, 1989; Homewood, 2008; Reid et al., 2014; Sullivan and Rohde, 2002). In turn, pastoralists have helped to create and maintain the ecological mosaics that characterise African savanna systems for millennia (Marshall et al., 2018).

In this context, pastoralist decision making can be understood as minimising risk for long-term productivity, as opposed to market-orientated framings which are premised on maximizing yield per unit area for short-term gain. These important insights do not discount the possibility of degradation or herbivore-plant dynamics in arid and semi-arid rangelands, but instead emphasise that these are often tied to political factors, for example confining animals to inappropriately small areas of rangeland through exclosure, or by destroying existing institutions of landscape management (Rohde et al., 2006; Sullivan and Rohde, 2002).

1.1.2 Marginalisation, fragmentation, and sedenterisation of Kenyan pastoralists

In Kenya, histories of economic and political marginalisation and under prioritization mean that many arid and semi-arid rangelands have weaker social and economic services, than the wetter, cultivation-based areas (Elmi and Birch, 2013; Oxfam, 2006). As in other rangelands, many government policies (from colonial times to present) have promoted the sedenterisation, or settling, of pastoral people, into non-mobile and permanent communities (Fratkin and Roth, 2005; Oxfam, 2006; Rutten, 1992). At the same time, access to key grazing, water, and mineral resources have been curtailed, or lost completely, to other forms of land use, including cultivation (Homewood et al., 2001; Southgate and Hulme, 2000; Watson, 2010), and conservation (Cavanagh et al., 2020; Pas, 2018; Pellisa et al., 2018). Many pastoral systems have therefore undergone

rapid changes and transitions to a more fragmented system, with consequent impacts on livelihoods, governance, culture, and coping capacities to inevitable shocks (Homewood et al., 2009b; Reid et al., 2014).

Research on the social, health, and economic consequences of reduced pastoralist mobility in northern Kenya suggests that "sedenterisation is neither good nor bad" (Fratkin and Roth, 2005:23). Instead, for pastoralists who were once mobile, the transition to sedenterisation provides some opportunities, such as increased access to health care, formal education, and markets, but also inevitably brings costs, such as new health hazards or losses in nutritional status (Fratkin and Roth, 2005). Furthermore, in arid and semi-arid rangelands, sedenterisation together with the subdivision of larger communally owned areas into smaller holdings results in reduced vegetation biomass over a multi-year period, caused by year-round grazing (Groom and Western, 2013). This in turn decreases the number livestock that can be supported, and displaces wild animals onto other higher-biomass rangelands, typically those that are still larger and communally owned. Furthermore, the regular distribution of sedenterised pastoral settlements on subdivided land also directly displaces wild animals because of constant human presence (Groom and Western, 2013). Other developments stemming from sedentarisation, such as fencing of land parcels and permanent water access points also have repercussions on rangeland productivity and livestock and wild animal populations.

1.1.3 Diversification of livelihoods

As pastoralists in places like East Africa have increasingly lost access to open landscapes, as sensibilities of pastoral people change, and as the number of people living in arid and semi-arid rangelands grows, the number of livestock per capita has decreased (Reid et al., 2014). This has left people more vulnerable to shocks, such as droughts. In the past people could use traditional coping mechanisms, such as mobility over a large and variable landscapes, but these are now undermined by the fragmentation of their rangelands (Galvin et al., 2008; Homewood, 2008; Little et al., 2001). Many pastoral communities are therefore looking to diversify their household activities and livelihoods, particularly into cultivation, wage labour, and small-scale business (Homewood et al., 2009b). The pathways to diversification are numerous, and can vary drastically depending on whether a household is poor or wealthy. A poor household might have limited access to resources or opportunities, and therefore end up in insecure low paid menial labour, or attempting riskier, rain fed agriculture. A

wealthy household might more readily diversify into other activities to spread their risk.

The existence of wildlife resources in landscapes managed by pastoralists like the Maasai in Kenya and Tanzania, has led in some instances to the alienation of land from pastoralists for wildlife conservation (Brockington, 2002). Conservationists argue that the continued presence of potentially high earning wildlife resources in Maasailand could also present an opportunity for communities to benefit from managing their landscapes in a way that continues to support populations of wild animals (Homewood et al., 2009b). I will now discuss the shifting debates on conservation, and the potential of community-based conservation.

1.2 Shifting debates in conservation

1.2.1 Conservation, a changing spatial practice

The conservation of wild animals in East Africa is a spatial practice (Adams et al., 2014). As such, it represents a major use of arid and semi-arid land in East Africa (Enghoff, 1990; Riggio et al., 2019). Spatial forms of conservation in East Africa can be broadly grouped into two general forms: fortress conservation (Adams, 2004; Brockington, 2002) and community-based conservation (Adams et al., 2004; Adams and Hulme, 2001; Hulme and Murphree, 1999; Western et al., 1994).

1.2.2 Fortress conservation and community-based conservation

Fortress conservation is based on the principle that the state should alienate land to protect it for conservation (Brockington, 2002). In East Africa, these lands are often national parks and reserves with remarkable wildlife and landscapes, which can attract millions of tourists every year (Balmford et al., 2015). Income from these areas accrues at a national level in the form of significant foreign income, tax revenue, and jobs (Kenya National Bureau of Statistics, 2020; World Bank, 2019). This form of conservation resulted in the creation of numerous protected areas across East Africa, including Nairobi, Serengeti, Amboseli, Tsavo, and Tarangire National Parks which were all founded at different times on the idea that people had to be removed or excluded from these areas, in order to conserve them, and maintain their wilderness values (Adams and McShane, 1992).

Over the last 50 years however, there has been a shift away from the singular focus on parks and reserves, and instead, to support, inspire, or involve locally resident communities in conservation efforts (Adams and Hulme, 2001; Hulme and Murphree, 1999; IUCN, 1993). This "community-based conservation" sought to fill in the gaps around and between national parks and reserves which, on their own, are often too small or scattered to protect and sustain large, wide-ranging herbivores and carnivores in an uncertain future (Government of Kenya, 2015; Heller and Zavaleta, 2009; Western et al., 2009). As such, community-based conservation describes a plethora of approaches to conservation. For instance, one of the first community-based conservation approaches in Africa was "conservation and development" where conservation authorities retained control over resources but work with communities to ensure they benefit (Western, 1982). Homewood (2008) suggests that the emergence of this form of community-based conservation grew from an awareness of the impacts of conservation efforts on local resource users (and others). At the same time, local institutions were increasingly recognised to be effective in managing for ecological sustainability. Other forms of community-based conservation include community-based natural resource management which proposes that local communities who own their natural resources can and should be allowed to control, sustainably manage, and benefit from them (Songorwa et al., 2000).

As Homewood (2008) implies, this paradigm shift in conservation emerged in conjunction with a shift in ecological thinking from views which defined nature and wilderness as ultimate goals[1] to notions that anthropogenic disturbances have manipulated, created, and destroyed nature for millennia (Berkes, 2004; Cronon, 1996; Jackson and Hobbs, 2009).

1.2.3 Community conservation and poverty: positive narrative, what about the reality?

It is commonly argued that communities may choose to engage in conservation if the livelihoods they can derive from conservation provides economic value; if the benefits from conservation outweigh the losses of curtailing previous behaviours; and if community conservation creates empowerment through authority over local resources (Nilsson et al., 2016).

[1]Albeit, area-based wilderness conservation continues to be an influential concept in conservation and ecology, see Allan (2018).

This is rarely the case in reality, yet, manifold community conservation approaches continue to be portrayed as being beneficial to local people, businesses, and national economies, whilst at the same time also meeting conservation objectives. Indeed, community-based conservation initiatives are often premised on their ability to find "win-win" scenarios, where wildlife, or ecosystems, are conserved, and local communities can generate economic, social and economic benefits from their efforts. Such narratives are powerfully positive (Büscher, 2008; Büscher and Fletcher, 2019), but of course, the realities are much messier (Chambers et al., 2020).

There are numerous examples of conservation interventions premised on inevitable success, that result in negative outcomes for people, and sometimes the environment too (Duffy, 2000; Roe et al., 2010; West et al., 2006). Sometimes local land uses and livelihood systems are undermined in efforts to conserve the very ecosystems that people were previously managing and using (e.g. Sachedina, 2008; Homewood et al., 2001; Wright, 2017b; Brockington, 2002). Even when there are benefits, local people are often unable to take advantage of these to the same extent as wealthier, better placed, internal and external elites. Most worryingly, when things do not work out, local people are often the first to be blamed (Bluwstein et al., 2016; Mbaria and Ogada, 2016; Moyo et al., 2016). Overall, it seems that the local, social outcomes of conservation interventions are messy, dynamic, and context dependent (Upton et al., 2008).

1.2.4 Conservation in Maasailand

East African rangelands owned and managed by the Maasai host a remarkable diversity of wildlife. This fact has resulted in the communities who host this wildlife being both vilified and lionised. On one hand, they are seen as a threat to conservation, either on the grounds that they do occasionally kill wild animals (Kissui, 2008), or because their pastoral mode of livelihood is seen as in competition with wild animals (Howell, 1987). Yet on the other hand, Maasai and their livestock are often said to successfully co-exist with wild animals more readily than other forms of land use (Niamir-Fuller et al., 2012; Western et al., 2020).

Wild animals and the livestock of pastoralists have lived together in East Africa's rangelands for millennia (du Toit et al., 2010; Marshall, 1990; Marshall et al., 2018). The relationship between wild animals and livestock can be complementary, but there can also be significant costs in the form of competition, disease, and predation (Butt and Turner, 2012; du Toit et al., 2017; Odadi et al., 2011). Human-wildlife conflict in

particular, both direct and in-direct (Redpath et al., 2013), is a chronic, multi-faceted, and dynamic cost for people living with wild animals (Dickman and Hazzah, 2015). Overall, the potential synergies can be maximised when livestock and wild animals are in large, non-fenced, non-fragmented rangelands with habitat heterogeneity where both livestock and wild animals can access variable pasture and water, and avoid disease (Western et al., 2020).

Kenya supports a relatively well-developed safari tourism industry, and despite the number, size, and importance of its formal protected areas of parks and reserves, most wild animals are still found outside these areas, notably in arid and semi-arid rangelands (Tyrrell et al., 2020; Western et al., 2009). In Kenyan Maasailand, the promise of community-based conservation mentioned above, has resulted in a proliferation of "community conservancies" which appear to have become the principal attempt at linking local land owners and managers to the potential benefits they might derive from the presence of wildlife on their land, and for wildlife protection to expand beyond protected areas.

In the Kenyan context, community conservancies are areas of land set aside for the purpose of conservation, with varying aims, but generally, they are based on the same ideals of community-based natural resource management, where land-owners protect and benefit from a healthy and productive environment and the wild animals that exist on it (King et al., 2015). In Kenyan Maasailand, community conservancies are often based on the assumption that eco-tourism can provide potential benefits from conservation which can be additional to existing livelihoods (Western et al., 2020).

1.2.5 Eco-tourism: promises and perils

Tourism is a global industry that has grown significantly over the past century, and in particular over the past couple of decades. The subset of nature-based tourism has also followed this rapid growth trend (Balmford et al., 2015). Eco-tourism can be understood as a form of nature-based tourism which focusses on interacting with nature, in a way that minimises negative impacts (Roe et al., 1997). Therefore, by this definition, not all nature-based tourism can be described as eco-tourism (Stronza et al., 2019). Eco-tourism attempts to link the economic value that tourism can create from landscapes, wildlife, and cultures, back to local communities, who then, as the idea goes, help to conserve these (Roe et al., 1997; Stronza et al., 2019). That's the promise of eco-tourism, however, in practice, things are often different. The tourism

industry has been quick to recognise the value of using the rhetoric of eco-tourism to gain approval and interest from potential customers. Likewise, many conservation projects have been quick to include eco-tourism in their projects, as a way to link conservation to revenue generated from tourism.

Eco-tourism is often regarded as a panacea to conservation problems, yet at the same time, eco-tourism is inextricably linked to global market forces, and global mass travel, as has been made painfully clear by the recent effects of the loss of tourism on conservation, following the COVID-19 pandemic (Lindsey et al., 2020). Eco-tourism can, and indeed does generate revenue for a vast chain of beneficiaries. Local communities who manage the landscapes, or host the wildlife that tourists come to visit, are unfortunately often at the bottom of this chain, and receive slender rewards. They may receive some cash benefits, but these are often only enough to support households who are directly employed through eco-tourism, or those who are in positions of power (Bedelian, 2014). The aforementioned benefits also often come at a cost, including restrictions to resources, or livelihood practices, as well as the burden of living with potentially dangerous wild animals.

Eco-tourism is underpinned with the notion that the economic benefits of eco-tourism will incentivise people to change their behaviours, rules, or cultures as they pertain to natural resources, for the sake of eco-tourism. New livelihood opportunities that are brought into being from eco-tourism, are often additional to existing livelihoods, and can be invested in activities which can undermine the natural resources on which eco-tourism depends. For instance, in the Maasai Mara, Thompson and Homewood (2002) found that local earnings from tourism were sometimes reinvested in large-scale cultivation, which was driving land use change and the loss of wild animals (Homewood et al., 2001).

1.2.6 Complex realities of community-based conservation

So although the rhetoric of community-based conservation in pastoral areas suggests that additional benefits from eco-tourism should help to conserve wild animals, the realities of the benefits of conservation in pastoral lands are complex. Overall wild animal numbers in Kenya, both inside and outside protected area have decreased substantially over the last 40 years (Ogutu et al., 2016; Western et al., 2009). Extensive research from across southern Kenyan Maasailand by Homewood et al. (2009b) showed that declines in wild animal numbers in pastoralist areas with community-

based conservation are often due to discrepancies between the theory and practice of community-based conservation. Existing policies appear to be undermining rather than fostering sustainable livelihoods and conservation. For example, although eco-tourism is seemingly compatible with pastoralism, the benefits, which are often inequitably distributed, may not adequately compensate for the opportunity costs such as restricted access to grazing resources and the potential dangers of wild animals (ibid.). Even in the most profitable community conservation areas in Kenya, the vast majority of households generate the majority of their wealth from livestock production (Thompson, 2009).

These findings echo those from a decade earlier by Igoe and Brockington (1999) who also saw that achieving community conservation in the context of inimical policies, attitudes, and interests was challenging. Unfortunately, all too often, the goals of conservation supersede local priorities, particularly when these initiatives are externally funded, or linked to lucrative tourism opportunities (Bluwstein, 2017; Sachedina, 2008). These facts pose a risk to pastoralists, who continue therefore, to be at risk of losing their land to conservation (Bluwstein, 2017; Brockington, 2002; Sachedina, 2008), particularly where, as described above, there continues to be a narrative of pastoralism as archaic, environmentally destructive, and a driver of land degradation.

It appears that the benefits from conservation are greater when pastoral people can choose to engage in conservation or not, when they have strong rights to tenure, when state policies and practices allow local people to fully benefit (Homewood et al., 2012), and when this does not come at the expense of sacrificing other livelihoods (Western et al., 2020), particularly livestock based activities (see for example Thompson, 2009, although even in this case, some people lose out, as discussed in Cavanagh et al., 2020). Furthermore, the possibilities of benefiting from community-based conservation in rangelands must not undermine the ways in which people cope with periodic livelihood challenges, such as droughts.

1.3 Droughts and managing local social-ecological systems through critical junctures

In the context of arid and semi-arid rangeland systems, variability in rainfall is a regular occurrence, and this is seen as part of the way of life for pastoralists (Chieni and Spencer, 1993). In this context, a drought could therefore be defined as "rainfall less

than the mean lower variability limit" (Bake, 1989:142). This, in essence, refers to a meteorological drought, when a prolonged rainfall shortage impacts hydrology, ecology, and agriculture (Wilhite and Glantz, 1985). However, droughts can have severe effects on people, and social-ecological systems. By focussing solely on the consequences of a change in supply, this definition does little to account for social processes in the causes or consequences of a drought, such as changes in demand for water.

Instead, we can define drought as a reduction in water supply, directly from rainfall, or supplied through other means, to a level below the mean lower variability limit, which results in decreased vegetation productivity (rangeland vegetation, and cultivation), and increased effort to access water for people and animals. This ties changes in water availability, to their use, and allows us to understand both changes in the supply, and demand for water, as potential causes of drought (Wilhite and Glantz, 1985). This definition is similar to that used by Maasai, who use the word *olameyu*: aridity, lack of grass[2]. However, the Maasai definition of drought also encompasses other potential social, economic, and political drivers, where a lack of grass might, for example, be the result of exclusion from a grazing area, or land fragmentation.

1.3.1 The changing nature of drought

Droughts can have devastating impacts on people and other forms of life in rangelands (Angassa and Oba, 2013; Butt and Turner, 2012; Carabine, 2014; Zwaagstra et al., 2010). There is a perception amongst pastoralists that drought shocks are worsening (Kimiti et al., 2016). Particularly severe droughts over the past two decades alone have occurred in 1999-2000, 2005, 2009-2010 (Ogutu et al., 2014), and 2016-2018. These increasingly severe drought cycles are often mistaken and simplified as caused by Malthusian dynamics and Hardin's Tragedy of the Commons; too many people, too many cows, not enough land, not enough food (Hardin, 1968). In fact, the devastating impacts of these droughts must be understood in the complex context of restrictions to drought coping mechanisms in rangelands such as: changing land use and tenure (BurnSilver and Mwangi, 2007); rangeland fragmentation (Goldman and Riosmena, 2013); unequal access to resources (Abbink et al., 2014; Goldman and Riosmena, 2013); changing institutions (Goldman and Riosmena, 2013); and restrictions to mobility (Kimiti et al., 2016).

[2]This is based on the definition from (Mol, 1996), but also from discussions with Maasai friends, during fieldwork.

These changing dynamics impact livestock herbivory in late season pastures which has a large influence on determining the severity and intensity of the drought for pastoralists (Illius and O'Connor, 1999). The increasing frequency of meteorological droughts across the region (Funk, 2012) may result in more frequent loss of livestock, wild animals, crops, and starvation (Government of Kenya, 2012). In the context of climate change, it is therefore important to note that while climate change does and will continue to affect the distribution of natural resources, other environmental, social, economic and political factors are also having significant impacts and often over a shorter time scale (Lind et al., 2016).

1.3.2 Coping with drought, what is changing?

Coping with the effects of drought continues to be a priority for people living in arid and semi-arid rangelands, but responses too, continue to change. Looking at how people cope with drought allows an understanding of how coping mechanisms are being affected by changes in ecological, political, social, and economic systems. Campbell's (1999) research on how the responses of Maasai pastoralists changed between the droughts of 1972-1976 and 1994-1995 illustrates this. Campbell found that coping mechanisms in 1972-1976 included movement of livestock beyond their Group Ranch boundaries; liquidation of assets; use of additional environmental resources; and praying to the rainmaker. People also relied on social coping strategies mediated through kin, clan, and age-set networks.

By the 1994-1995 drought, the use of environmental resources had increased and social coping strategies had decreased. Livelihood diversification became the most useful strategy for people to cope, with increased trade, horticultural production, incomes from eco-tourism and wildlife-related work, and migration in search of jobs helping to mitigate the hardships caused by droughts. These changes occurred as a result of the loss of mobility and access to key resources, growth in the area under farming, and the integration of local economies into national ones; all processes that continue today (Kimiti et al., 2016).

More recently Goldman and Riosmena (2013) found that Maasai pastoralists were finding new ways to cope with drought. They found that although mobility remains a key coping mechanism for pastoralists, it is restricted by rangeland fragmentation with land enclosed in farms and conservation areas. To overcome these, mobility now occurs in new ways, and new strategies such as purchasing feed are being adopted, but these

require money and new forms of knowledge that are not available to all. Also, research by Carabine (2014) found that Maasai living in Amboseli faced a dilemma when it came to droughts. Ultimately many people wanted to maintain their pastoralist way of life, but to achieve this during drought periods, they have had to diversify their livelihoods. In so doing, they are also altering land use and livelihoods in ways that could in turn undermine the pastoral system they want to maintain.

1.3.3 What can drought reveal?

The aforementioned research reveals two important points. Firstly, the importance of mobility in the pastoral system means that access to resources in other locations in the landscape remains vital for coping with drought. Secondly, the consequences of slow, incremental changes in the social and ecological systems of arid and semi-arid rangelands become apparent when there is a shock, such as drought. The recent growth of community-based conservation in pastoral areas can affect mobility and access to resources. The social and ecological changes which result from this become apparent when drought impacts the system.

Droughts therefore can be usefully understood as critical junctures: shocks to a social-ecological system which change what is ecologically or socially possible (Green, 2016). Critical junctures can be catalysts of change, or moments when rearrangements of the social-ecological system, including the actions of institutions of governance, or people more generally, can seek to maintain, or transform the system (Davies et al., 2015; Green, 2016).

As discussed above, conservation interventions can often be processes of spatial territorialisation. This reality means that these spaces can interact with the spatial effects of droughts, in a number of potentially different ways. For instance, community conservation areas are often set aside in areas that are key to traditional livelihood activities, or key resources at particular moments, such as droughts. Restrictions on the use of these areas, or their resources, for reasons of conservation, can create significant social trade-offs (Bedelian, 2014).

On the other hand, Osano et al. (2013) argue that through incomes from eco-tourism, community conservation areas have the potential to be especially important during drought times, acting as a risk mitigation strategy through livelihood diversification.

Setting aside conservation areas is not an action that expressly intends to be a strategy to alter the social and ecological effects of droughts. Yet, social-ecological

complexity means that it is often hard to know how a conservation intervention, like setting aside a conservation area, will affect other aspects of the system (Brehony et al., 2018, 2020). In particular, there has been little research attention on the effect that system shocks, like droughts, have on these social-ecological systems, how social systems might organise to overcome these, or how the costs and benefits of conservation interplay with these shocks.

Therefore, in the context of droughts in arid and semi-arid rangelands, the very nature of community conservation *areas*, with their potential social and ecological costs and benefits, means that they are an important focus for research.

1.3.4 Recent severe droughts: 2009 and 2017

To explore these questions, this thesis will focus on the two most recent severe droughts in Kenya's Southern Maasailand, one from 2008-2010, and the other from 2016-2018. In a typical year, Kenya's Southern Maasailand has an annual, bimodal precipitation cycle with a long rainy season typically from March to May, and a short rainy season from November to December or January[3]. These cycles are driven by movements of the inter-tropical convergence zone, the influence of the El Niño-Southern Oscillation, and the influence of Indian Ocean temperatures (Funk et al., 2008). This bimodal precipitation cycle in East Africa supports higher livestock biomass, and allows pastoralists to take advantage of year-round milking (Western and Finch, 1986).

Both the 2009 and 2017 droughts were the culmination of several years of low rainfall (Appendix A.1) and decreased vegetation (Appendix A.2) in Kenya's Southern Maasailand. Both droughts began in earnest with the failure of the short rains in October-November 2008 and 2016, respectively (Appendix A.3). Over the following year, in both 2009 and 2017, there was very little rainfall. For Kenya's Southern Maasailand, the 2009 drought abated in December 2009, and in the case of the 2017, not until January 2018. Over both these devastating periods of low rainfall, numerous livestock died, crops failed, wild animals died, and people were severely affected (Zwaagstra et al., 2010).

Over the 2009 drought, across Kenya's Southern Maasailand, more than 50% of people were dependent on government food relief at some stage (Carabine, 2014; Zwaagstra et al., 2010). Over the 2017 drought, 3 million people required food aid (Uhe et al., 2018) and the drought was declared a national disaster by President Uhuru

[3]See for instance Appendix A.3.

Kenyatta (Government of Kenya, 2017). In sum, these were both significant, and severe droughts with devastating social and ecological effects.

1.4 Interlaced natures of people and ecologies

If we define conservation as a process of establishing, improving or maintaining good relations with nature (Sandbrook, 2015), then it is implicit that this is fundamentally about the relationship between the social and the ecological. Indeed, geographers like David Harvey remind us that "ecological arguments are never socially neutral any more than socio-political arguments are ecologically neutral" Harvey (1993:25).

Yet, a review by Miller et al. (2012) showed that few studies have addressed both the social dynamics and the environmental outcomes of conservation initiatives. Instead, much research is still carried out through a distinct discipline, resulting in either a social, or environmental perspective, leaving out disciplinary in-betweens. One solution to unveiling these in-betweens, is to integrate multiple disciplinary approaches into a shared interdisciplinary research approach (Margles et al., 2010). Blackstock et al. (2007) have usefully summarised the arguments in favour of interdisciplinary research as 1) normative, by increasing legitimacy; 2) substantive, by improving understanding and selection of appropriate solutions; 3) instrumental, by defusing potential interdisciplinary conflict through joint ownership of knowledge produced.

It is perceived that the results of interdisciplinary research can create knowledge which is (more) socially just and (more) ecologically effective than singular disciplines (Bennett et al., 2016b). However, achieving this is difficult in practice, and requires careful consideration of an appropriate conceptual framework[4].

1.4.1 Social-ecological systems perspective

The social and ecological sciences are rooted in different epistemologies and they do not combine easily. A significant and eclectic body of Western academic work attempts to provide a society/environment articulation, for example Blaikie (1985); Blaikie and Brookfield (1987); Davidson-Hunt and Berkes (2003); Whatmore (2006). One such

[4]This kind of research does not typically fit into a neat academic discipline, however I am grateful to have found a home in Geography, which I heard one academic liken to "the refugee camp for interdisciplinary researchers." In fact, Murdoch (2006:174) suggests that geography's main intellectual concern might now be "the mingling of various entities in complex assemblages, networks and or systems."

attempt, by Berkes and Folke (1998), used the "social-ecological systems" concept to underpin a framework that could be used as an analytical structure to study local natural resource management systems.

As Colding and Barthel (2019) note, the notion of social-ecological systems was in fact first coined in 1970 by Ratzlaff (1970) in the field of engineering. It was over two decades later that this notion was turned into a framework for studying the ways in which humans intertwine with their environment, by Berkes and Folke (1998). In so doing, they sought to "match the dynamics of institutions with the dynamics of ecosystems for mutual social-ecological resilience and improved performance" (Berkes and Folke, 1998:4). Berkes and Folke (1998) suggest that linking social and ecological systems is about integrating two streams of resource management theory. The first is about systems and adaptive management, where there is an emphasis on linkages and feedback controls across social and ecological systems. The second is about people-oriented institutions and property rights.

Whereas models help to describe how things work, and theories explain phenomena, conceptual frameworks help us to think about phenomena, to order material, and to unveil patterns. A social-ecological systems perspective can be a useful conceptual framework to help unveil patterns and potentially lead to new models and theories, in a manner that sets out to emphasise equivalence between social and ecological dimensions, while also emphasising that integrative analysis can be as useful, or even more useful than delineation (Folke et al., 2005).

Today, social-ecological systems is an established and widely used concept in environmental sciences, social sciences, economics, medicine, psychology, arts and humanities (Colding and Barthel, 2019). Although there are now numerous definitions of social-ecological systems, Bouamrane et al. (2016) simply describe them as: "interdependent and linked systems of people and nature that are nested across scales." This simple definition belies the difficulties that exist in trying to understand social-ecological systems, a task only made harder in pastoral rangelands which are highly variable across space and time (Homewood, 2008).

The task therefore, is to find a framework which remains simple in essence, but can incorporate complex system dynamics. A comparison of ten frameworks for analysing social-ecological systems by Binder et al. (2013) found that the social-ecological systems framework proposed by Ostrom (2009) is particularly useful in understanding the interactions and outcomes of a complex social-ecological system. Ostrom's (2009) social-ecological systems framework is an adaptable yet structured

approach to understanding the processes that lead to the changes in natural resources, using a systems-based approach that aims to treat ecological and social components equally. The social-ecological system framework originates in the discipline of political science and is based on theories such as collective choice, common-pool resources, and natural resource management (Binder et al., 2013). It aims to move beyond simple panaceas, and towards a diagnosis of "the source, and possible amelioration, of poor outcomes for ecological and human systems" (Ostrom and Cox, 2010:1).

Establishing a diagnosis when faced with a problem in a social-ecological system requires carefully studying complex multi-variable, non-linear, and cross-scale interactions, and how these are changing through time (Brehony et al., 2020; Liu et al., 2007). The social-ecological systems framework achieves this by analysing the attributes and interactions of four main subsystem categories: resource users, governance system, resource system, resource units (Figure 1.1). These categories interact in focal action situations between the subsystems, which then lead to outcomes and feedback to each subsystem.

The social-ecological systems framework attempts to embed the influence of social factors on the system, including individuals, institutions, governance structures and existing policy in the framework (Ban et al., 2013; Brehony et al., 2020). It can also be applicable at defined local, regional, national, and international scales, and incorporate interactions across scales (Cumming et al., 2015). However, in striving to bridge distinct epistemologies and research cultures, the social-ecological systems framework faces obstacles, particularly when it comes to balancing the perpetual internal tensions between integration, and analytically useful categorisation.

1.4.2 Resilience

Resilience can at once mean many things, or be meaningless. It is a slippery concept whose ever increasing use and abuse seems to devalue its strengths. In this thesis, I will use the resilience concept as a lens to ask questions and improve our understanding of the social-ecological system I investigate (Folke, 2006).

The resilience concept emerged in ecology (Holling, 1973) from the discovery, based on observation, that living systems have multiple basins of attraction or domains of stability (Folke, 2016). This means that resilience, per se, is not necessarily a good thing, as undesirable system configurations can be very resilient with a strong capacity to remain in that state. A resilience lens is one way to understand change and the

multiple, cross-scale interactions in social-ecological systems (Anderies et al., 2004; Berkes et al., 2003). As a research lens, I will use Berkes et al. (2003) definition of the three key features of resilience in social-ecological systems: 1) the ability of a system to absorb or buffer disturbance and still maintain core attributes; 2) the ability of a system to self-organise; 3) the capacity for learning and adaptation in the context of change.

However, without careful consideration, a resilience lens can have its limitations. For instance, Cote and Nightingale (2012) argue that a resilience approach to research needs to engage with the insights from social sciences about agency, power, and knowledge. Kull and Rangan (2016) argue that resilience approaches need to remain open to a diversity of understandings about the multitude of factors affecting human-environment interactions. Indeed, attempts to use a resilience lens in conservation research often result in a focus on ecological resilience to a disturbance (e.g. poaching, or land use change), and seldom attempt to incorporate a social perspective (Bennett et al., 2016a; Fabinyi et al., 2014; Fischer et al., 2009). Therefore, it is crucial to include resilience *from what to what* (Carpenter et al., 2001), and resilience *to whom* (Cavanagh, 2016). These important additions to the concept of resilience recognise that people have the ability to imagine the future and can influence, manage or prevent undesirable trajectories (Walker et al., 2004). That is to say, although systems can exhibit uncertainty and unpredictability, management decisions which may affect some people and ecosystems over others, are still made.

1.4.3 Using the social-ecological systems framework with a resilience lens

In debating and attempting to figure out how best to look at complex social and ecological issues, with an interdisciplinary slant, I came to the conclusion that, for this thesis, a social-ecological systems framework, with a resilience lens, would be best suited (see Figure 1.1).

Although this approach has its limitations, Olsson et al. (2015) summarise that it does have analytical potential in integrating approaches across scales, subsystems, and spaces through the dynamic coupling of social and ecological components (Stojanovic et al., 2016). I also feel that this kind of conceptual framework, which emphasises non-linear dynamics, system shocks, and processes of adaptive governance, is well suited to East Africa's arid and semi-arid social-ecological systems (Leslie and McCabe,

2013; Liao and Fei, 2017; Robinson and Berkes, 2010; Robinson et al., 2015), where pragmatic research approaches to real work problems are needed (Stojanovic et al., 2016)[5]. Such an approach provides a useful framework to use interdisciplinary methods to achieve a relevant empirical grounding in ecology and human management, factors which are sometimes missing in other approaches (Blaikie, 2012; Braun, 2015).

Drawing on this conceptual framework, I will provide a rich, or thick description of the context, to answer my research questions, through a detailed look at one part of the social-ecological system, or through the interplay of system components (Anderson and Bollig, 2016; Rissman and Gillon, 2017). I illustrate this by working through two hypothetical scenarios (see Figure 1.1).

If certain members of a community decide to designate land as a conservation area, this alters the governance system (Figure 1.1), as it is a new way of managing and governing land at the local level, but supported through national, or even international processes. The conservation area may set new rules for actors (Figure 1.1) within this local system, some of whom may have supported this change and follow rules, others of whom may not have, and who may now even seek to undermine it. The feedbacks from this process may alter these social subsystems. It may also alter the resource units over ecological time (Figure 1.1), by changing grass productivity, or possibly entire ecosystems. This could in turn alter the numbers of wild animals, which could then lead to changes in competition, tolerance, and conflict with actors, who might then seek to alter the rules. And so on.

We could also hypothesise how a drought might affect this. A series of low rainfall periods affect the wider resource system of grasses, trees, rivers, and so on, and eventually results in a drought. The lack of vegetation is detrimental to both domestic and wild animals. These changes are likely to trigger responses from actors, and the governance system. Actors might follow the rules set through governance systems, for instance a change in the rules about where people can build settlements. Or, actors

[5]For instance, Liao and Fei (2017) studied concepts of resilience amongst Boran pastoralists in Ethiopia and Kazak pastoralists in China, by asking open ended questions about the meanings and manifestations of resilience in their respective local contexts. Both groups defined resilience as, essentially, the maintenance of decent pastoral livelihoods through time. This is contingent on keeping a viable number of livestock, which in turn is contingent on mobility and access to resources. Interestingly, for them, this does not preclude the option of diversification; as Liao and Fei (2017) found, many pastoralists see livelihood diversification as a crucial way to maintain resilience. Likewise, in an East African context, (McCabe et al., 2010) found that many Maasai were diversifying their livelihoods by adopting cultivation, to remain pastoralists.

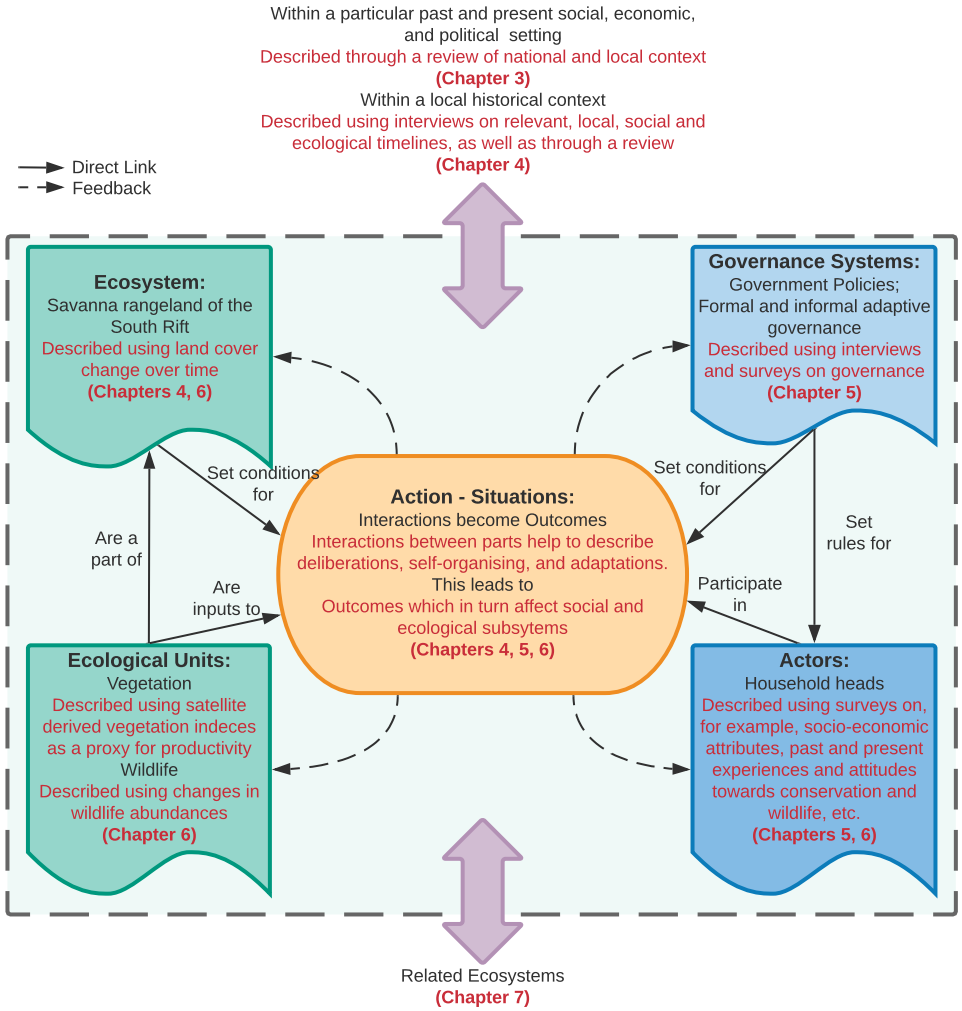


Figure 1.1 The social-ecological systems framework, an adaptable, structured approach to understanding the interactions and outcomes of a complex social-ecological system through an approach that aims to treat ecological and social components equally. This figure has been adapted from McGinnis and Ostrom (2014) to the context of this research project. The components that I will focus on in this thesis are given for each sub system. In red, I provide examples of the kind of data I will gather to understand this subsystem, as well as the Chapters where I analyse or discuss that particular aspect.

might try other strategies, such as seeking work elsewhere, cutting down trees, or killing wild animals, to earn money.

Through the research presented in this thesis, I collected information and data based on my research questions, to provide informed descriptions of these kinds of

interactions, for my case study area.

1.5 Research questions and organisation of this thesis

With this conceptual framework in mind, in this thesis, I set out to understand changing social and ecological resilience to drought, and the role of community-based conservation in a part of Kenya's Southern Maasailand known as the South Rift, an area I will describe in much greater detail in Chapter 3.

In order to achieve this, I set out the following three principal research questions (see Table 1.1 for how these questions were broken down further):

1. What is the historical context of droughts and conservation in the South Rift?
2. How are natural resources governed in the South Rift social-ecological system, which includes community conservation areas?
3. How have changes to each of the subsystems of the South Rift social-ecological system which includes community conservation areas, altered social-ecological resilience to drought?

In **Chapter 2** I will introduce the research approach and methodology pursued in this thesis, and I introduce each of my main research methods. I finish by reflecting on important ethical considerations in my methods, and my own positionality.

Chapter 3 begins with a background and historical overview of the Maasai people, the main cultural group in my study area. I follow this with important and relevant contextual information on Kenya's colonial history; changes to land tenure in post-independence Kenya; and the history of conservation efforts in Kenya. Finally, I describe the study area. This builds an important description of the past and present social, economic, and political setting for the local social-ecological system I focus on in this thesis (Figure 1.1).

Following this, I set out to answer my three principal research questions over the following chapters. Each of these research questions is further broken down into further specific questions, as shown in Table 1.1.

Chapter 4 sets out to understand the historical context of droughts and conservation in Kenya's South Rift. I begin by looking back at the historical context of livelihoods, droughts, conservation, and the impact of changing land tenure in the South Rift. I then investigate the provenance of the Olkiramatian and Shompole conservation areas.

Next, **Chapter 5** investigates the governance of natural resources in the South Rift's current social-ecological systems, which includes community conservation areas. Once more, I examine how current institutions of governance differ from those of the past, and indeed, how current institutions govern and enforce rules. In particular, I examined how natural resource governance institutions function during drought periods.

Chapter 6 builds on all of this context to investigate how changes to each of the subsystems of the South Rift social-ecological system (Figure 1.1) have altered social-ecological resilience to drought. I focus in particular on the role the community conservation areas are playing in this context.

Finally, **Chapter 7** concludes by emphasising the key contributions that this study has made and examines these in the broader context of community-based conservation in southern Kenya.

Table 1.1 Research questions of this thesis

What is the historical context of droughts and conservation in the South Rift?
What is known about major historical disturbances to the social-ecological system in the South Rift, particularly changes to livelihoods and land tenure?
What is the historical context of droughts in the South Rift?
What is the historical context of conservation in the South Rift?
What led to the formation of Olkiramatian and Shompole conservation areas?
How are natural resources governed in the South Rift social-ecological system, which includes community conservation areas?
How do current governance institutions differ from those of the past? What leadership opportunities exist for women in this context?
How do local institutions govern in the South Rift social-ecological system?
How do local natural resource governance institutions operate through critical junctures such as droughts?
How are rules sanctioned and enforced?
How have changes to each of the subsystems of the South Rift social-ecological system (Figure 1.1) which includes community conservation areas, altered social-ecological resilience to drought?
What long term changes to land cover have occurred, with particular attention to the dry season grazing refuges? How are these related to the presence of the conservation areas?
What long term changes to vegetation productivity, vegetation composition, and wild animal numbers have occurred? How are these related to the presence of the conservation areas?
In what ways do the interests of eco-tourism operators alter the management of the conservation areas?
How have the way household heads feel about the presence of the conservation areas and wild animals changed over time? How is this influenced by the wealth of the household?
Which households are most affected by human-wildlife conflict (HWC)?
How do the community conservation areas affect social-ecological resilience to drought?

Methodology

> "There is no royal road to science, and only those who do not dread the fatiguing climb of its steep paths have a chance of gaining its luminous summits."
>
> — Marx (2015) Preface to French Edition of *Das Kapital* (1872)

2.1 Research approach and considerations

Assessments of social-ecological systems are challenging. The complex nature of these systems requires an integration of theories and knowledge from social and ecological disciplines, which have different epistemological histories (Ostrom and Cox, 2010). This kind of research faces numerous obstacles including disciplinary incentives, research cultures, and funding (Rissman and Gillon, 2017). Successful research therefore requires sets of indicators from both ecological and social perspectives, combined in different and often innovative ways (Quinlan et al., 2016).

The theoretical objective of combining methods is, however, not easy in practice. Each method takes time, and requires its own expertise and theoretical underpinning. Therefore, careful thought must be given to how each method will achieve its desired aims and outcomes within the context of the research (Creswell and Clark, 2011). Furthermore, given the vast number of potential variables it is important to ensure that there is a balance between being too narrowly focussed and missing the bigger picture, or being too broad and losing precision and depth. Either of these can result in an unachievable or partial project.

The social-ecological systems framework described in Chapter 1 attempts to balance this conceptualisation and these multiple variables by focussing on the interactions and

outcomes of four key elements: resource systems, resource units, governance systems, and actors (Figure 1.1). Therefore, to build a balanced conceptualisation of the social-ecological system I set out to study, I aimed to understand the historical context of the social-ecological system, the actors in the system (I focus on the household level, more on this in Section 2.4), the governance systems within which they operate, the broad-scale ecosystem, and the relevant ecological units.

I set out to achieve this using a mixed-methods approach of collecting qualitative and quantitative data. Although challenging to achieve, this approach can strengthen the research by reducing bias and highlighting inaccuracies that might arise if only one method was used. Creswell and Clark (2011) set out the following key benefits of using mixed methods: they help in achieving triangulation between results from different methods; there is complementarity and clarification from one method to the other (e.g. through illustration); the results from one method can inform and strengthen the development of the methods in the other. Bryman (2016) also adds the following points which are relevant to this research: different methods can be used to answer different kinds of research questions; each method can offset the weaknesses of other methods. Although these are important benefits, aside from the challenge of achieving interdisciplinary mixed-methods, a further challenge arises when attempting to report and interpret methods and findings in ways that are accessible, even when these are outside the reader's own disciplinary expertise[1].

2.2 Study area selection

I was brought up in East Africa, and followed my parents from country to country: southern Tanzania, to southern Uganda, to central Sudan, to central Ethiopia, and to northern Tanzania, before I left home to complete my education. Before I began my PhD thesis, I worked in southern Kenya for the South Rift Association of Land Owners, and spent close to two years living in Kenya's Southern Maasailand. During this period, I made friends in this area and came to learn about conservation, pastoralism and other local livelihoods, land management, and the effects that droughts had on both the people and the ecosystem. My links with, and interest in this area, resulted in my drafting a research proposal that focussed on understanding the differences in community conservation, land management and conservation, on either side of the

[1]I also ask that readers bear this in mind if some of the material I present in this thesis is outside their own disciplinary comfort zone.

Kenyan and Tanzanian border. However, as I was about to begin my PhD in late 2016, a severe drought, which had begun in early 2016, continued unabated in many parts of Kenya's Southern Maasailand. My friends from the area told me of the impact it was having on them, their families, livelihoods, and the ecosystem. After some rethinking, and help from Drs. Liz Watson and Andrew Plumptre, I realised this was a topic that deserved greater research attention, particularly given the paucity of research conducted in the part of Kenya's Southern Maasailand (Figure 2.1) that I was interested in (see Chapter 3). Therefore, I decided to make this area the focus of my research.

2.3 Research timeline

After successfully completing my first year report, as well as my ethics and risk self-assessment for the Department of Geography, I had not yet received research clearance for my field research, so I conducted some preliminary remote sensing analyses of my case study site, and set up a draft pilot of my household survey. I began fieldwork in Kenya in October 2017. The first two months in southern Kenya were spent between Shompole Group Ranch, Olkiramatian Group Ranch, and Nairobi city (see Figure 2.1 for a map of these areas in relation to Nairobi, and Figure 2.2 for maps of each Group Ranch). As I will describe in greater detail in Chapter 3, Group Ranches are a form of land tenure where a group of registered members communally own a parcel of land under private title. While in Olkiramatian and Shompole Group Ranches, I based myself at the Lale'enok Resource Centre in Olkiramatian, and spent my days preparing the pilot household survey, designing the Android application I would use to implement it, and looking through documents and reports in the personal files of current and previous leadership. In the evenings I worked through a two-month language course in Maa, the language of the Maasai, with a local teacher. I was fortunate to already be fluent in Kiswahili, and English, the two official languages of Kenya. However, the reality is that in rural areas like parts of Kenya's Southern Maasailand, many residents prefer to, or can only, speak in their own local Maa language.

I also formally introduced myself to the current Olkiramatian and Shompole leadership at that time, including the Group Ranch chairpersons, vice-chairpersons, secretaries, treasurers, the member of the county assembly, and the administrative chiefs from the Office of the President. I conducted some preliminary interviews with friends to establish if my questions were relevant and appropriate, and to see if other lines of enquiry might be worth pursuing further. In Nairobi I spent my time

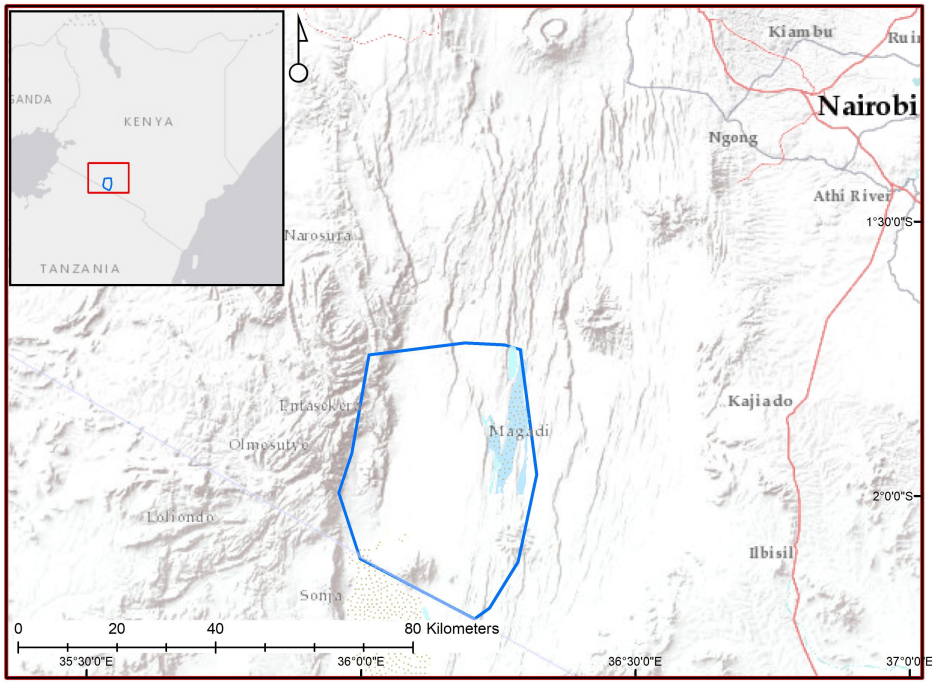


Figure 2.1 A topographic map of Southern Kenya with the case study area shown by the dark blue polygon, which represents the area I focus on in subsequent maps. The map also demonstrates distance to Nairobi, the Kenyan capital. The inset map helps to show the location of the study area in Kenya, and East Africa. Service layer credits: ESRI, USGS, NOAA, HERE, Garmin, OpenStreetMap contributors, GIS user community.

in the offices of various organisations, and looking through the institutional records of the African Conservation Centre, who facilitated the process of establishing the conservation areas in the South Rift.

After consulting with local informants and friends, I hired my Maa language teacher, Mr. Sepis Dan Ole Lemanyi, as a research assistant. Before we began working together, I spent one afternoon going through all of my own research ethics notes and considerations with Sepis so as to share with him the kind of things I was mindful of as I carried out my research. We spent many long days travelling, interviewing, discussing, translating, and transcribing. I began semi-structured interviews in November 2017 and continued these throughout my fieldwork period, as people became available, and as my list of people I wanted to interview grew.

Following this I translated the pilot household survey (see further details below), designed the Android application for the survey, hired and trained research assistants, and carried out the pilot survey in December 2017. In January 2018 I held feedback meetings with all my research assistants and began analysing the results of the pilot.

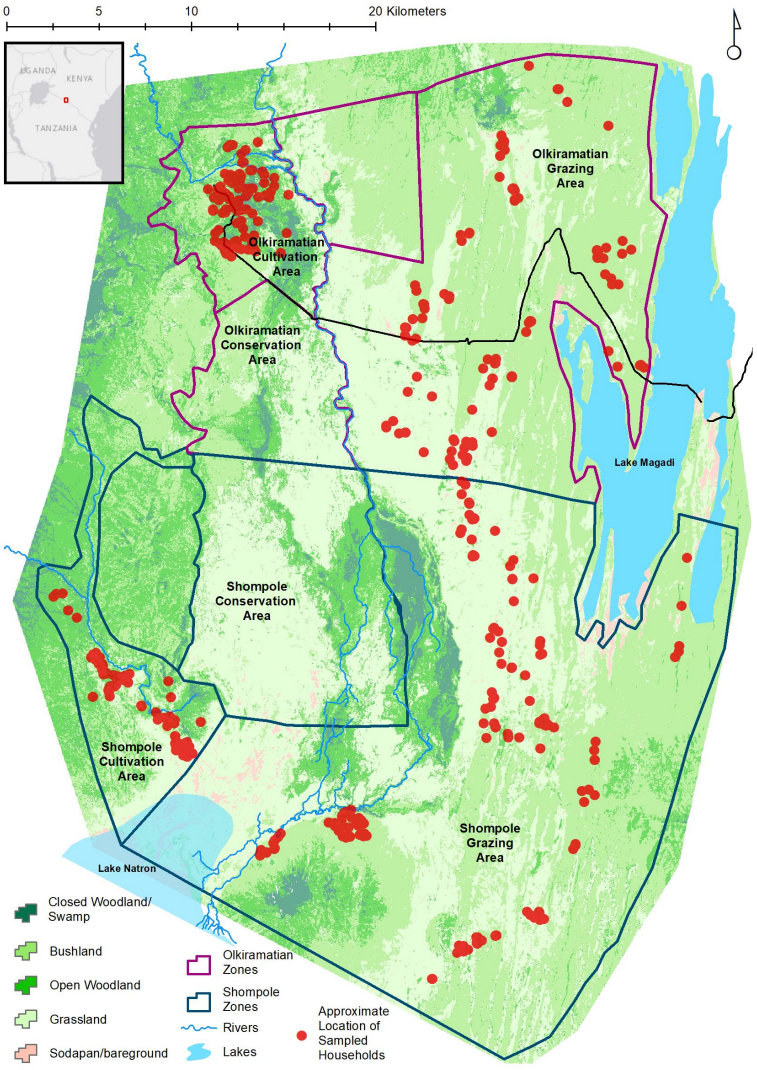


Figure 2.2 Approximate locations of the surveyed households with land use zones, overlaid on a 2019 land cover classification. The inset map helps to show the location of the study area in Kenya, and East Africa. Service layer credits: ESRI, USGS, NOAA, HERE, Garmin, OpenStreetMap contributors, GIS user community.

This led to significant changes to the household survey. Once these were all completed, and once the drought which began in 2016 had ended[2], I rehired and retrained my research assistants over a two day training course. The majority of the surveys took place from August to October 2018[3]. The final list of questions is shown in Appendix B.1. As my survey was taking place, I travelled around the area to meet up with my research assistants, check their progress, and sit in as an observer in their questionnaires. I was

[2]The drought was severe and so many people would not have been able to take the time to answer questions, nor would I have felt justified in asking them to participate during those tough months.

[3]Four surveys of household heads who were frequently absent were not completed until December.

generously hosted in the homesteads of people from across the area. Throughout this period, I continued transcribing, and translating my semi-structured interviews, and document analysis.

I returned to Cambridge in October 2018, completed the translation and transcribing of my semi-structured interviews, and began my analyses. I also began the process of verifying, and analysing my household survey data, which took several months to complete. At this stage I began data collection and analysis of my aerial photography data, and remote sensing data.

Finally, as I began to see how the thesis might be structured, by October 2019, I began to write up my empirical chapters. In March 2020, following the outbreak of COVID-19 in the UK, and after I had completed two empirical chapters, I suddenly had to leave Cambridge to live with my parents in Tanzania. Over the following months I completed analyses and writing for the remaining chapters.

2.4 Methods

I will now provide details on each of the specific methods that I used for my household survey, semi-structured interviews, document analysis, research diary, and research assistant reports and maps. I provide details on the methods I used to collect and analyse aerial photography data, remote sensing data, and wild animal count data, as well as statistical models developed to analyse data from the household surveys, where I present them, in Chapter 6.2.

2.4.1 Household survey

The first issue I had to decide for this method was on the most appropriate level at which to focus the survey. I concluded that the level of the household was the most appropriate level for my study area, based on the insights of Campbell (1999) who showed that local processes at the household mediate the national and international driving forces of governance and policy[4]. Furthermore, focussing on households meant that I could reasonably account for how my variables of interest were distributed across space, and across the spectrum of wealth categories (Homewood et al., 2009b).

In Maa vocabulary, there is no one word for household. The definition of the various ways of understanding the household in the Maa culture took significant reflection

[4]Refer to Chapter 3 Figure 3.4 for how I understand this.

and discussion with research assistants and local friends. In the end, based on these discussions and insights from the literature (e.g. McPeak and Little, 2017; Coast, 2001; Homewood et al., 2009a), and the aims of this research, I decided that the *olmarei* was the household unit that I would focus on. The term *"olmarei"* refers to a collection of houses around a communal gate (Jacobs, 1965), and consists of a man, his wife (or wives) if married, dependent children and dependent relatives (Coast, 2001), who no longer depends on his parents (particularly the father). In some cases, a woman can be the household head, either because she has sought to be independent, or left an unsuitable marriage, or is a widow. An *olmarei* may live independently or join with others to form an *enkang'*. It is the centre of livestock ownership and is autonomous in decision making (Coast, 2001; Jacobs, 1965), symbolised by the separate gate of each *olmarei* in an *enkang'*. Because of the potential ambiguity in how *olmarei* might be understood, I made sure that before any questions were asked about the *olmarei* in the survey, the participant was given a short, precise description of exactly what I meant by *"olmarei"* in the context of this research.

The definition that I used was as follows: The household (*olmarei*) refers to a household within the homestead boma (*enkang'*), with its own gate. The household (*olmarei*) can make decisions about most things independently. The household head (*olopeny olmarei*) can be a man or woman who has dependents, like one or more wives, children, grandchildren, parents, dependent siblings, and others who live with the family and depend on them for food. It can also be a woman who looks after herself and her family, or a widow, or any son who does not rely on his father, even if he lives in the same homestead boma (*enkang'*). The household (*olmarei*) might have houses (*inkajijik*) here, and elsewhere, like in another homestead boma or a town centre and it is important that you include them in your calculations about your household. An old man should not include in his calculations, his sons who now have their own households (*olmarei*). The household survey questions were directed at the head of the household (*olopeny olmarei*).

2.4.2 Developing household survey questions

Before I arrived in the field, I prepared a pilot household survey with questions that would allow me to answer my research questions, and which were similar to those that had already been used in Maasailand, to build on existing knowledge and to allow for comparability (Coast, 2001; Franks and Small, 2016; Hess et al., 2017; Homewood et al.,

2009b), but were adapted to ensure their suitability for the local context. Once I was in Kenya, these questions were translated into Kiswahili and Maa with the help of a small groups of friends from within the community (more on this below). These questions were then tested in a pilot study of 80 households, where each multiple option questions included an "other" option, thereby allowing participants to include potential variables that I had not initially considered. The review of the pilot study that I conducted with my research assistants highlighted some questions which were misinterpreted, or resulted in other forms of sampling bias (Bryman, 2016). For instance, I had initially included questions about household activities, and herd structure from before 2000[5]. However, most participants found these very difficult to answer as many of them could either not recall exactly when this was, or could not remember. These questions were subsequently dropped. Furthermore, open ended questions about the costs and benefits of the conservation area were not well understood. Therefore, these questions were modified to be more easily answerable as agree/disagree type questions.

The final household survey contained sections on each of the following:

- Details specific to that survey (date, time, location)
- Demographics of the household
- Assets ownership and asset diversity of the household
- The main livelihood activities of the household and how these changed over the 2009 and 2017 drought[6]
- Support received and level of meal skipping over the 2009 and 2017 droughts
- Changes in self-defined wellbeing over time
- Livestock ownership and herd structure, and how these changed over the 2009 and 2017 drought
- Cultivation and crops
- Perspectives on the conservation area, resource rights, and access[7]
- Access to water, and how this changed over the 2009 and 2017 drought
- Perspectives about wild animals, and data on human-wildlife conflict

[5]That was the year that Shompole conservation area was set up.

[6]For these I used an approach similar to Eriksen et al. (2005) where I asked people which activities they engaged in, comparing answers they give for each drought and non-drought season.

[7]Here, I used an approach similar to Franks and Small (2016) to look at the direct and in-direct costs and benefits of the conservancies, whilst also following the conservation survey recommendations of Browne-Nuñez and Jonker (2008).

- Household expenditure
- Leadership and governance
- Perspectives on the future of the household

In a study such as this, where some questions ask people to think about the past, recall is an important issue to consider (Stopher, 2012). The memory of interviewees is fallible, and recall of an event will depend on the length and timing of the event, and its saliency to the lives of the individuals (Sudman and Bradburn, 1982). This is a real challenge, but these memories of the past, whatever their characteristics now, are still important, and recall aids can be used to either assist people to recall, or to ensure that when people are not sure of their memory of the past, they are given the option of not answering. In the first case, relevant recall aids exist for the part of Kenya's Southern Maasailand where I conducted my research. Significant moments that most people can recall include the sudden influx of people and livestock from another area, the eruption of the nearby Oldonyo Lengai volcano, or the adoption of Kenya's new Constitution. All of these significant moments are used in this survey to help people remember before, during and after the 2009 drought. Only after explaining the order of these events were interviewees asked if they remember their circumstances during that period. In the second case, if interviewees were unsure of when these events happened, or their circumstances at that time, they were given the option of answering "I don't know".

Nevertheless, there are also other issues when surveying people. For various reasons, people sometimes don't tell the truth; they may not understand a question but still provide an answer; they may change their answer depending on who is asking the question; they may say what they think you want to hear (Lohr, 2010). These are realities when using surveys and all of these issues must be taken into consideration when interpreting results.

The next consideration was how to sample households.

2.4.3 Populations and stratified sampling

I defined my study population as those households currently living within the Olkiramatian and Shompole Group Ranches (I will describe this area in more detail in Chapter 3, and also see Figure 2.2[8]).

Taking a randomised sample from a population makes it more likely that any differences found are due to chance and not due to systemic bias in sampling. When some prior characteristics about the population are available, stratified sampling can be used to give the same precision as simple random sampling, at a lower cost (Deaton, 1997; Lohr, 2010; Lumley, 2010)[9]. Stratified sampling involves dividing the study population into groups called strata, and drawing separate probability samples from each one. Stratification ensures that a pre-specified number of observations from each stratum end up in the sample, which is therefore less variable, yet can give more precise estimates.

In order to achieve a stratified random sample using probability sampling, I first constructed a sample frame (Newing, 2011) with *"olmarei"* (household) as the principal unit. A complete sampling frame and appropriate sample size are important so that randomness is not undermined. However, constructing a sample frame is a difficult process in remote areas[10].

To construct the sample frame my research assistant and I went to each location in each of the Group Ranches, and compiled a list of all the households living in that area, based on our definition of household (see Section 2.4). In each location, we met up with a contact who lived in the area, and requested their help to compile the first list of households currently living in their area. We then visited the local spokesperson for the area, or local administrative chief, and went through this list of households with them to include households that were missed out, or to remove duplicates. When there was uncertainty about the households in an area, we travelled to that area, and talked to the people living in the area about the households that were there. Finally, I reviewed

[8]As shown in Figure 2.2, parts of the Shompole cultivation area in Pakaase are located beyond the Group Ranch boundary borders which have been recorded by the Lands Department, however, many members of Shompole believe this to be part of their Group Ranch, and this area has an administrative chief, and so I treated it as part of Shompole.

[9]I did not use cluster sampling as I didn't want to miss out on the characteristics of certain sampled households based on their geographic distance from a cluster. Furthermore, although cluster sampling can reduce travel time and sampling effort compared to stratified sampling, in pastoralist communities households are often sparsely located across an area, so a certain level of travel was expected.

[10]Both Group Ranches have Group Ranch registers, but many more households are resident in the area, than those who are officially in the registers.

the list and grouped together similar names, which were then all reviewed with our local friends from the area to ensure that they were indeed separate households. The final list included 2908 *olmarei* (Table 2.1). This was a slow and difficult process, but it was smoothed because settlement patterns in Olkiramatian and Shompole are planned and controlled (see Chapter 5). Also, there remain strong social ties and social capital in these areas, which meant that people were incredibly aware of who was living where, who was related to whom, or who had moved out of their parents' homestead or not.

The real world is not perfect and even with all this effort, it is important to note that sampling frames can still miss households with particular characteristics. For example, sample frames might not capture homeless people[11] or households that are new to the area, or household that were there informally, or they might miss households who are regularly absent[12], or include households that are no longer present, or that have been counted elsewhere. Although this does not prevent using the data to make inferences (Deaton, 1997), it is important to note this as these missing households were not missed at random.

The challenge of stratification is that membership to a stratum must be based on known differences in the population, and this must be known for every individual in the population. In the case of Olkiramatian and Shompole Group Ranches, location has a known effect on the principal livelihood of the household. Although livestock remains culturally significant and most Maasai households derive some income from livestock, there are now many households who rely on other sources, such as cultivation (Homewood et al., 2009c). In both study Group Ranches, no cultivation is allowed in the areas east of the Ewaso Nyiro River. Therefore, to ensure that the sampling strategy for the household survey accounts for both households who predominantly practice transhumance pastoralism and those who are predominantly sedentary and live in the cultivation areas (Figure 2.2), the population was therefore divided into four strata: Olkiramatian East, Olkiramatian West, Shompole East, and Shompole West.

The stratum sample size was determined by the size of the population within the strata and the level of homogeneity expected, combined with the fact that the accuracy of sampling statistics increase in proportion to the square root of the sample (Deaton,

[11]I made efforts to avoid this in my sampling, but this resulted in cases where homeless people were chosen in my random sample, but because of issues of mental health, or substance abuse, unfortunately, they could not answer questions.

[12]For instance, although every effort was made to include the better known wealthiest households in the area in the sample frame, it is still hard to know if the sampling process included *all* the wealthy households, particularly those who spend most of their time away from the area.

Table 2.1 Population size (N) and sample size (n) of the household survey.

	Olkiramatian East	**Olkiramatian West**	**Shompole East**	**Shompole West**	**Total**
Total number of households (population size N)	408	784	1369	347	2908
Number of households sampled (sample size n)	99	151	208	104	562
Sampling weights for each sampled household	4.1212	5.1921	6.5817	3.3365	

1997). Therefore, sample sizes are smaller in larger populations (or strata) and larger in smaller populations (or strata). This is particularly important if estimates are needed for subsets of the population, as well as the whole population, or if a survey is being carried out for multiple purposes (Stopher, 2012). The large differences between the population sizes in each of the strata meant that I had to use stratified sampling with variable sample fractions (ibid.). This meant that any analysis could not assume that the relationship between the sample sizes in each stratum relative to the total sample is equal to the relationship between the population sizes of each stratum with the total population. Instead, all analyses used sampling weights for each stratum (Stopher, 2012; Table 2.1).

To allow data from the household survey to be used to make design-based inferences, the sampling method had to meet the following criteria. To make estimates: every household had to have a non-zero probability of ending up in the sample; the probability of ending up in the sample had to be known for every household. Then to work out the precision of these estimates (standard errors): every pair of households in the sample had to have a non-zero probability of both ending up in the sample; the probability of both households ending up in the sample had to be known for every pair

that end up in the sample.

2.4.4 Research assistants

In order to save time and cost-effectively sample more than 560 households over a large area (Table 2.1; Figure 2.2), I decided to use the help of research assistants when conducting household surveys. Research assistants were chosen based on the following criteria: they were members of the community; they had completed secondary school education; they were respected community members who would be accepted into the houses of their neighbours[13]; they were not employed at that time; they were not in a position of leadership; and they were not directly related to any Group Ranch chairperson, or anyone employed in tourism or conservation in the area[14]. Before they began the household surveys, I conducted a two-day training course for all research assistants (as mentioned above) where we discussed my research, and why I asked each of the questions I was asking. Before this, I also asked them to back translate each question to understand how questions would be interpreted, and to test the accuracy of the translation. Once the final version of the question was agreed, I emphasised the importance of reading the questions exactly as they were written. We also discussed research ethics, participant confidentiality, and we conducted several practice interviews.

2.4.5 Designing a survey instrument

The household survey was built and administered using ESRI's Survey123 (ESRI, 2018b). I created an application for Android phones, which my research assistants could easily use to track the location of the households they had to survey; to collect answers; to easily change the survey language; to collect GPS locations within a set accuracy threshold; to store completed surveys; and to upload them to a secure location. Figure 2.3 shows screenshots from the application, of different stages of the survey. The application also allowed me to incorporate several data validation checks including: limiting answers to specific choices; skipping questions based on their previous answers; limiting the range of numbers acceptable; checking that all

[13]Unfortunately, this criteria made it impossible to hire women as research assistants as I was repeatedly told that many older male household heads might refuse to answer a woman's questions in this kind of setting.

[14]I replaced two of the research assistants I used in my pilot survey when I found out they were related to current senior leaders, which I felt might compromise the survey responses.

questions were answered; reminding the administrators to read out the introduction to the research; to ask for consent; and to thank them at the end. The application also allowed me to conduct several background checks every time a survey was conducted, such as the start time and end time, and the location of every interview. Furthermore, answers were automatically coded, and uploaded to a password protected account, which I could use to check on each research assistant's progress, and use to flag up any reliability issues. I also used a process of back-checking 5% of the surveys each research assistant collected to ensure reliability (Newing, 2011).

In order to conduct the surveys, each research assistant was given a carry bag, laminated papers which described the research, smart phones, power banks, pens and notebooks to record any issues that occurred. Before the start of each survey I made sure that the participant was informed about: who I am; the university I am based out of; that I am an independent researcher; the objectives of my study; how the data I collect would be used; that I could not make any guarantee that the interview or research would lead to changes in their life; that access and dissemination of all the information they provided would remain confidential and anonymised; and that they were free to refuse to answer any question, or to terminate the survey at any time, without explanation. The research assistant then had to ask explicitly if they consented to participate, and their answer was recorded. This resulted in a few instances where the intended household refused to participate, or could not participate (Appendix C.1). After the end of each survey, the participant was thanked, and they were presented with a small non-monetary, but culturally appropriate token of gratitude for their time, comprising animal de-worming tablets that were difficult to source locally. Survey participants were also given my contact details, in case they had any questions. This resulted in five people calling me to find out more information about my research. The locations of all the surveyed households across the study site are shown in Figure 2.2.

2.4.6 Data quality

Following the completion of the household survey, I conducted some preliminary analysis to identify potential issues with the data, such as outliers, or consistent answers. I then reviewed and discussed all of this, as well as the field notebooks with each research assistant. During this process, I noticed a bug in the application I had designed which meant that sometimes, when questions were skipped based on an earlier response, the skipped answers were still completed with those provided by a previous

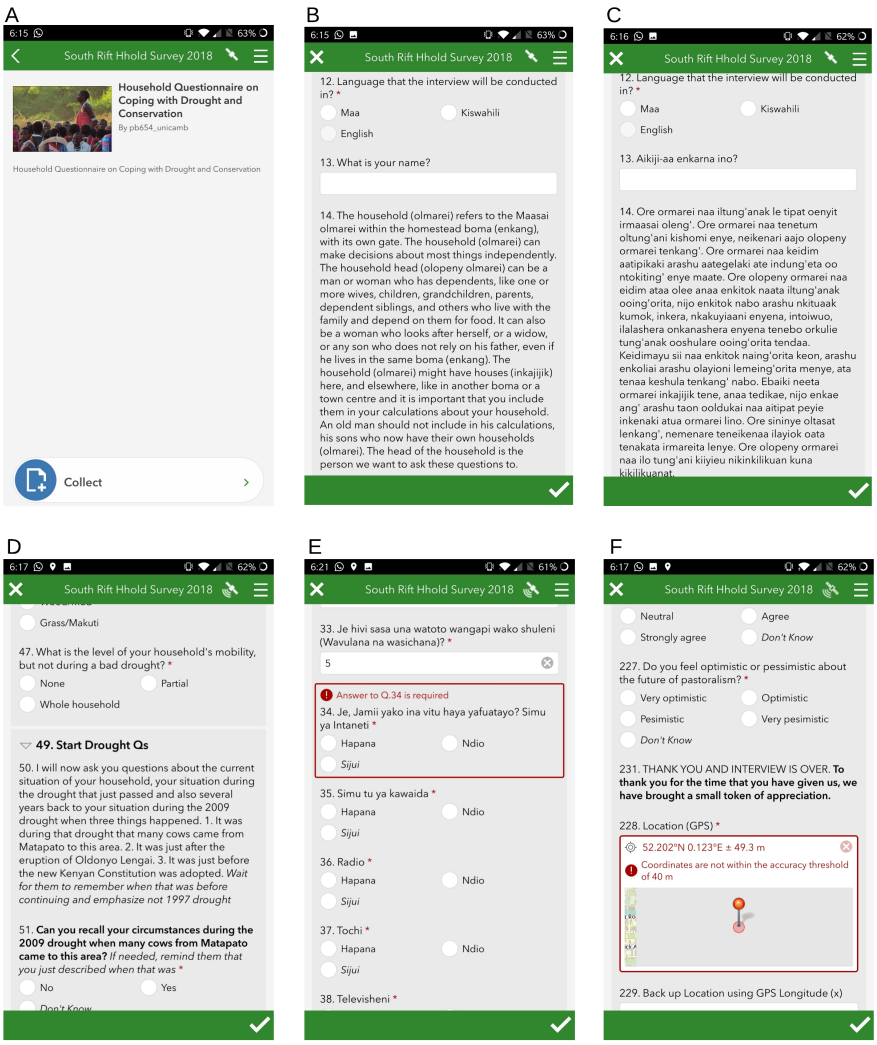


Figure 2.3 Screenshots from the survey application I designed. A. The opening page of the survey. B. The English version of the definition of household which I used in the survey that was read out to each responded. C. The Maa version of the household definition I used. D. The recall prompt before questions about the 2009 drought. E. The validation check which prevents a survey from being completed when a required question is left unanswered (Kiswahili version of survey). F. The GPS location recorder which requires an accuracy threshold to be met before the survey can be completed.

interviewee. I therefore filtered out all the questions that were supposed to be blank, based on a previous answer. For example, those that responded by saying they cannot recall the circumstances of their household in 2009 were not asked any questions about 2009, and therefore these answers were removed. Aside from this, there were a few cases where there were data entry mistakes from typing on the phone.

In the case of one research assistant, however, towards the end of the data collection period his location data, responses, and interview lengths were inconsistent and worrying. When we discussed this, the research assistant admitted that while travelling on the back of a motorbike to reach a new location, his smart phone and battery bank fell out of his pocket and broke. He was reluctant to mention this to me and instead downloaded the application onto a friend's phone. This phone had limited battery and so he would go to a household and ask them some questions using the phone, but when the battery ran out he would record the answers elsewhere and fill these in later in the day when the phone was plugged in again (usually these were questions about the household characteristics, the activities and the number of livestock). However, this process resulted in several errors, principally because the application was not designed to be used like this and so some answers were incorrectly filled in from other surveys. Once we discussed this, we reviewed all of his work and identified all of the interviews where this had occurred. Once this was clear, I provided him with a new phone, and hired him to re-conduct those interviews in full. Any changes that were made to the original survey database at this stage were noted in a separate document. Any changes that were made in the data cleaning and analysis are recorded in the computer code that I prepared.

To assess the data quality from the survey, I calculated the response rate, missing value statistic, and the level of measurement error. The response rate was based on the formula provided in Stopher (2012:436). This survey had a response rate of 0.98, which represents a very high return.

Missing values are those which represent either a refusal by the interviewee to answer, or the interviewee indicating that they did not know the answer. I used the formula provided in Stopher (2012:465) to arrive at a missing value statistic. In this dataset, there were a total of 75,361 potentially answerable questions, some of which were skipped based on previous answers. Of these, there were 554 "I don't know" answers which were taken as missing values. This gives a missing value statistic of 0.007 which indicates a good quality survey (Stopher, 2012).

Finally, some measurement error may have arisen from an incomplete sample frame. This is because some people or households are known by different names to different people. As discussed above, although every effort was made to minimise errors in the sample frame, it is possible that there were errors. For instance, it is possible that some households may have been counted twice if unrecognisably different names were used in different areas.

There were also cases where a household was repeatedly unavailable, or could not be sampled. All of these cases were recorded (shown in Appendix C.1), and a new random sample of households from the same strata were then surveyed.

Figure 2.4 A research assistant using his smart phone to interview the head of a household near their *olmarei*, with their face masked to maintain anonymity.

2.5 Analysis of household survey data

In this thesis, I predominantly used design-based, or survey-based inference when analysing the household survey. This is possible as the population is specified, and the data values are unknown, but regarded as fixed, and not random, unlike in most model-based statistics (Lumley, 2010). Given that the sample design (random selection of individuals from the fixed population) is under the control of the researcher, all probabilities can, in theory, be precisely known. In design-based inference, the goal of analysis to estimate features of the population, but not to generalise those to other populations.

All the analysis of the household survey was done in R (R Core Team, 2019), using the packages *survey* (Lumley, 2019, version 3.35-1) and *srvyr* (Ellis, 2019, version 0.3.5), through the *tidyverse* package environment (Wickham, 2017, version 1.2.1). All maps were created in ArcMap 10.4 (ESRI, 2018a). The R codes used to analyse data and draw figures are available for each of the chapters, upon request.

The analysis of the household data began with an exploration of the data and descriptive statistics, based principally on the advice of Lumley (2010); Zuur and Ieno (2016); Zuur et al. (2010), but bearing in mind the differences between design-based inference and model-based inference (Lumley, 2010).

In a randomised complex survey, as suggested by Lumley (2010), estimates of the population totals can be calculated from the Horvitz-Thompson estimator of the population, with a finite population correction[15]. Based on this, we can calculate the variance of the estimator, the population or subpopulation means, the standard errors, and the 95% confidence intervals, which is the principal error variable I use in this thesis.

The Horvitz-Thompson estimator $\widehat{T}$ of a population total T_X, is:

$$\widehat{T}_X = \frac{N}{n} \sum_{i=1}^{n} X_i \tag{2.1}$$

Where the population is N, the simple random sample is n, and the measurement of variable X on person i is X_i. The variance of this Horvitz-Thompson estimator is calculated by:

$$var\left[\widehat{T}_X\right] = \frac{N-n}{N} \cdot N^2 \cdot \frac{var\,[X]}{n} \tag{2.2}$$

Where the first term of the formula is a finite population correction[16], the second term rescales from the mean to the total, and the third term is the variance of a mean. The standard error estimator of the total can then be calculated as the square root of $var\left[\widehat{T}_X\right]$. Confidence intervals for estimates are calculated by using a Normal distribution for the estimate, thus 1.96 standard errors are added and subtracted, respectively, for a 95% confidence interval.

From these totals, the mean of variable X can then be estimated as the sample average by:

$$\widehat{\mu}_X = \frac{1}{n} \sum_{i=1}^{n} X_i \tag{2.3}$$

The variance estimate of this is obtained by dividing the variance estimate of the total (shown in formula 2.2) by N^2:

$$\widehat{var}\,[\widehat{\mu}_X] = \frac{N-n}{N} \cdot \frac{\widehat{var}\,[X]}{n} \tag{2.4}$$

[15] Although this makes calculations more difficult, it is not an issue when using a computer.

[16] This accounts for the reduction in uncertainty when a large fraction of the population ends up in the sample.

The standard error of the mean is the square root of $var\,[\widehat{\mu}_X]$.

In stratified sampling, each stratum is a simple random sample, therefore, the Horvitz-Thompson estimator of the total is the sum of the estimated totals in each stratum; the variance is the sum of the estimated variances in each stratum; and the (population) mean is estimated by dividing the estimated population total by the population size[17] N (Lumley, 2010).

Estimating means, totals, and other statistics for subpopulations that are not strata is complicated by domain estimation (Lumley, 2010). However, the *survey* package allows you to carefully report all survey related information, and to easily calculate robust subpopulation estimates.

Aside from these estimates, I also used generalised linear models to understand how factors interact with each other to affect a dependent variable, but this analysis is covered in Chapter 6.2.

2.5.1 Dealing with item and unit non-response in analysis

When dealing with item non-response, in other words, those who refused to answer a question, or those who were not asked a question, I followed the guidance of Lumley (2010) and, used the *survey* package as and when I needed them, to create a subset of each variable without any item non-response, from the original full sample.

As previously mentioned, the survey I conducted had 13 cases of unit non-response. Given this was a relatively low number, I did not post-stratify my results (see Lumley, 2010:135), but instead captured as much information as possible about why they refused to participate (Appendix C.1).

2.5.2 Constructing a Wealth Index

Filmer and Scott (2012), and more recently in the context of rural East Africa Brockington (2019), show that assets are useful in assessing wealth[18]. In agro-pastoral systems, asset-based measures which also include livestock (which have both material

[17]Note that the variance of the overall mean is the sum of the variances of the estimates from each strata, so variance only depends on within sector variance and not between sectors (Deaton, 1997).

[18]The main assumption when using an asset-based wealth assessment is that household wealth in the long-run explains the maximum variance (and covariance) in the asset variables (Filmer and Pritchett, 2001).

and social capital in many pastoral communities; Ferguson, 1985), can be a useful way to differentiate the poor and the non-poor (Little et al., 2008)[19].

To classify households into a Wealth Index, I followed the steps proposed by Vyas and Kumaranayake (2006), and constructed a Principal Component Analysis (PCA; see also Filmer and Pritchett (2001); Filmer and Scott (2012); Rutstein and Johnson (2004). In the household survey I asked questions about household assets, sources of drinking water, household roof material, household wall material, all of which were inspired by questions from previous studies. However, these were tailored to the local context with the help of my research assistants, local informants, and the results of my pilot survey. After the same descriptive data analysis steps described above, I broke down all multiple-category variables (household roof material for example) into binary variables. I also included Tropical Livestock Units (TLU; derived by summing numbers of ruminant livestock after they were scaled using Grandin (1988)'s Livestock Units: Cow = 0.71 TLU, Sheep and Goat = 0.17 TLU), as well as area under cultivation.

When all the household assets, sources of drinking water, household roof material, household wall material, TLU, and the total area of land cultivated by the household were used in a correlation matrix[20], the 1st order PCA explained 19.9% of the variation, with an eigenvalue (standard deviation) of 2.18[21]. When TLU and area under cultivation were removed and a covariance matrix was used, the 1st order PCA explained 29.5% of the variation, with an eigenvalue of 0.93. Therefore, although excluding TLU increased the variation explained, due to the fact that the eigenvalue was less than one[22], I used the PCA which included all the aforementioned variables[23]. Including TLU also reduced the known bias that exists with pastoral households who still practice whole household transhumance and who are therefore less likely to invest in more permanent

[19]There is some debate as to the value of assets versus expenditure as a robust proxy for long run wealth. These issues are discussed in Filmer and Pritchett (2001); Filmer and Scott (2012); Rutstein and Johnson (2004). More recently Brockington (2019) looked at the value of assets in understanding rural poverty. Overall, it appears that wealth indices are a robust proxy for long run wealth.

[20]As TLU and area under cultivation had to be scaled and standardised to be computed together with other variables.

[21]I checked for robustness by analysing eigenvalues, and visually inspecting the PCAs in two dimensional plots.

[22]When the eigenvalue is less than one, this means that the 1st order PCA explains less than a single explanatory variable.

[23]I did not equivalise the data (adjust for household size) after considering that this does not make sense for the variables that I used (Rutstein and Johnson, 2004).

household improvements or consumer goods that root them to a location[24] (see Little et al., 2008).

In trying to decide if the constructed Wealth Index provided a household wealth ranking that would be fair in further analyses, I examined the relationship between the Wealth Index, and other variables collected in the survey, which showed that it appeared to explain some wealth related effects (including strong relationships with level of education completed by the household head, and expenditure).

All data from the household survey are currently securely stored in a password protected folder on my personal laptop, and backed up on a password protected private server in the Department of Geography.

2.6 Semi-structured interviews

Focussing my research purely on the results of household surveys would have limited the type, and depth of information that I could gather for this thesis. Therefore, I also used qualitative data from semi-structured interviews in four ways: to gather data on governance in the social-ecological system; to listen to and record the histories of the people and institutions in the area; to listen to and record people's perspectives on conservation, wild animals, changing livelihoods, and droughts; and to help me to interpret, verify, and triangulate the results from other methods (Creswell and Clark, 2011). During this process, my aim was to reach saturation when trying to understand a particular theme (Bryman, 2016:305), which is when consensus around one or several perspectives allow you to make sense of the information, and when collecting more data produces little more new information or understanding.

These semi-structured interviews were conducted with purposively sampled participants. I developed a list of relevant people to talk to before I arrived in Olkiramatian and Shompole Group Ranches. After I arrived, this list changed as I began to better understand who might be important to interview. I also listened to the advice of others, such as research assistants and friends. I made every attempt to ensure that I interviewed people from different leadership categories, different areas, and different genders. This list continued to grow throughout my fieldwork, but I began to see some patterns and links emerging over time, in the data I was collecting. After leaving my

[24]However, examining the difference in the relationship between wealth index and mobility, as against expenditure and mobility, showed that a small bias remained, which was a limitation I had to consider as I interpreted my results.

field site and beginning to look over the interviews, I realised that I was still missing the perspectives of a couple of other participants, so I completed these interviews at a later date.

In total I conducted the following interviews[25]: Current leadership (including men, women, elders, youth, formal, informal, elected and appointed) - 28; Past leadership (only male elders) - 8; Conservation or Tourism stakeholder - 9; Local oral histories - 7; Other (Farm Owner, Herd Owner) - 3. The full list of interview participants and their redacted details are provided in Appendix D.1. Throughout the thesis, I will use the Reference Number given in Table D.1 to refer to interviewees.

As described above for the household survey, I read out a short script to my interviewees before I began (see Chapter 2.4). In particular, I emphasised that access and dissemination of all the information they provided would remain confidential and anonymised, unless they granted me permission otherwise. I asked for their consent to participate, and informed them that they were free to refuse to answer any question that I asked, or terminate the interview at any time, without explanation. If the interview went ahead, I asked for permission to record it[26], a request which I reiterated at the end of the interview[27].

During the interviews, I followed a topic guide tailored to that particular category of interviewee, which I prepared before the interview (Newing, 2011). This guide was helpful in keeping me focussed on the questions that related to my research questions. However, when other interesting and relevant themes emerged, I added questions to explore these further. I was conscious to avoid leading questions, but to keep questions open, and prompt for elaboration when necessary. I also tried to be as aware as possible of the potential effects of social desirability bias[28].

With regards to local oral histories, I chose participants that were from the oldest age-sets (some of the oldest living people) of the community, who were involved in

[25]A small number of interviews fit into two categories, e.g. past leadership and local oral history

[26]Using an Olympus WS-331M Digital Voice Recorder and noise cancelling microphone.

[27]There were two occasions where people agreed to be recorded, but it was clear that they found this intimidating and were suspicious of what the recorder did. I therefore used a tablet to type out notes from the interview instead. There were also two occasions where interviewees asked for parts of their interview to be omitted after the end of the interview.

[28]This is when people feel compelled to say things that they do not believe, or to opt not to mention some issues in a face to face discussion. Although I felt that this happened on occasion, I felt that re-framing questions generally helped to overcome it. However, there was one occasion when, following several attempts to re-frame questions, or try alternative approaches, I felt that the interviewee was uncomfortable and giving answers which emphasised that his family and village needed funding for various projects. I politely concluded this interview.

the events in which I was most interested, including natural resource governance, conservation, and drought coping strategies. I began these interviews by going over the timeline I had prepared, of locally and nationally salient social-ecological events (shown later in Figure 4.1). We then spent as long as was necessary discussing each of these events, and then discussing stand-out social and ecological events that happened before or after these moments, all the way up to the present (Thompson, 2000). I also asked if there was anything else they would like to share about their history in the area that we might have missed out. I distinguished between eye-witness accounts, and accounts heard from others, including eye-witnesses (ibid.). Overall, these interviews were open and free-flowing.

At the end of all interviews I thanked the participant and gave them the same small token of gratitude described above. I also reminded them of my contact number in case they would like to add or change anything that they said to me.

2.6.1 Transcribing and analysing interviews

All the interviews that I recorded were fully transcribed[29], which resulted in over 400,000 transcribed words. I carried out transcriptions when the interviews were in English or Kiswahili, or together with my research assistant when they were in Maa[30].

All the transcribed documents were transferred to Atlas.ti software (Scientific Software Development GmbH, 2019) for analysis, which made it easier to apply thematic codes, as well as select and highlight important quotations (Robson, 2011). Thematic codes and quotes helped to organise the data, by highlighting and linking instances when participants referred to themes that were relevant to my research questions, or to other important points made by other participants. This first step of analysis was then used to develop tables and diagrams which helped me to form the outline of important concepts that I felt I needed to cover, based on my interpretation of the information from participants, and my research questions. As part of my embedded

[29]Occasionally, sections with tangential events or stories were not transcribed, for instance when a neighbour came to greet and chat with the participant.

[30]For other researchers who might be interested, I transcribed most of these interviews by listening to the recording of the interview at 0.75x playback speed with earphones, and then using Google's voice typing in Google Docs to speak out what was being said (translating in my head where necessary). Although there were inevitably some errors I had to correct, this drastically decreased the time this process can take. Transcribing interviews that were in Maa was done by listening to the interviews together with my translator and research assistant, and then typing out their translation. This process was much slower.

mixed method design, I would also refer back to this organised, qualitative data when trying to interpret and analyse the results from other methods (Creswell and Clark, 2011).

The audio files and transcribed interviews have all been given code names and are securely stored in a password protected folder on my personal laptop, and backed up on a password protected private server in the Department of Geography.

2.7 Document analysis

I used documents collated from institutional and personal records, to further my understanding of the histories of local land tenure, local and national institutions or organisations that were active in the area, and the history of formal conservation in the area. Whilst looking through the documents in the institutional records of conservation organisations, I was particularly interested in trying to understand the roles that organisations such as the African Conservation Centre played in helping to set up the conservation areas in Olkiramatian and Shompole Group Ranches. Therefore, I focussed on looking through meeting minutes, proposals, project reports, and evaluations of the projects and work that was going on in Olkiramatian and Shompole Group Ranches.

Likewise, when I was granted access to the personal archives of local leaders, including Group Ranch secretaries and elected government officials, I was interested in understanding some of the events that took place in the Group Ranches, prior to the establishment of the conservation areas. I tried as much as possible to be mindful that these events were not simply institutional happenings, but rather, that there were individuals and institutions who were driving, or struggling against, these processes.

The challenge with this approach is that much is left out. This is where it was important that I used some of the information that I found in these records, and used these as points to ask people to elaborate on, or to look for further evidence. I was fortunate to be able to talk to several individuals who were directly involved, or witnesses to, many of the most important and relevant events. I tried, as best as possible, to verify, supplement, and triangulate some of the most important and relevant events that occurred with information from different sources, and different data types.

When I found interesting documents, I took pictures and notes, which I used to create a reference database of all the documents I consulted (shown in Appendix E.1), together with some key words, and a description of what the document contained. This

meant that I was able to analyse the documents more systematically, and made it easy to refer back to the documents when interpreting results, or during writing, if I had to refer back to a document.

2.7.1 Research diary

Throughout my fieldwork, I kept a research diary to provide a written record of my research activities. I also compiled notes from my interviews into my diary, and at the end of a day of interviews, I would discuss the day's work with my research assistant. Given that I lived at my research site for a year, there were several occasions when I witnessed something, or I had a serendipitous conversation with someone, including local friends, where I learned something relevant to my research topic (Newing, 2011:100). I recorded these in my research diary. Finally, I used the research diary as a way to reflect about the data I was collecting and my research. For instance, I used my notes to ask myself if I was being fair to what I was hearing, witnessing, and reading.

2.7.2 Research assistant reports and maps

In addition to the aforementioned work by my research assistants, I also asked each of them to write a report following the completion of my pilot household survey, with their experience, feedback, and advice. I also asked my main research assistant and translator Sepis Dan Ole Lemanyi to write up open ended reports about his own family life, family history, important local events he witnessed[31], and local practices of *osotua* (kinship, but also umbilical cord and peace). Finally, I also asked my research assistants and my local friends to all help me to draw up a map of all the local area names for locations in Olkiramatian and Shompole, shown later in Figure 3.3b (Newing, 2011:187). This was invaluable during my fieldwork to understand the area, and to orientate myself when people would refer to particular place names. This technique also brought to my

[31]From this research technique, I began to trace the events which resulted in the closure of the Olkiramatian and Shompole Community Development Project. I was also able to corroborate events in the build-up and aftermath of the burning of Sampu Tented Camp in Olkiramatian.

attention the depth and extent of local understanding and management of the landscape.

2.8 Research permissions

To conduct my research, I required a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI) in Kenya. This process also required that I have a research affiliation in Kenya, and so I was successfully granted an affiliation with the British Institute in Eastern Africa for 2017-2018. However, in 2017, the government of Kenya declared a temporary halt on the issuing of research affiliations from non-governmental institutions (NGOs). Therefore, I sought and paid for a research affiliation with the National Museums of Kenya. My research permit from NACOSTI was then granted, and I was also able to use this to receive a research pass from the Department of Immigration, which fulfilled my immigration requirements. Finally, I presented all of these documents to the Kajiado County Commissioner's office, and the Kajiado County Department of Education's office. I also introduced myself and conducted a short interview with the Deputy County Commissioner responsible for the area which encompasses Olkiramatian and Shompole Group Ranches. Once I was at my research site, I used the opportunity of leadership meetings that included elders from the communities to introduce myself and briefly share the aims of my research.

2.9 Ontological, epistemological, and ethical considerations in my research

All forms of research demand ontological, epistemological, and ethical consideration and accountability. Therefore, researchers, must be transparent and reflexive when it comes to this (Haraway, 1988; Koot et al., 2020). I used the categories suggested by Creswell and Clark (2011) to reflect about my own ontology, epistemology, axiology, methodology, and rhetoric, and how these might influence my worldview. I concluded that I saw myself and this research as based in a pragmatic worldview, where I believed that actions have consequences; where research can help to solve problems; where knowledge, values, information, and methods can be pluralistic; and where practice is real-world oriented (Creswell and Clark, 2011).

2.9.1 Ethical considerations

Before I began any of my research, I completed an ethics self-assessment, which was approved by the Department of Geography. In general, my personal research ethics were guided by the principle of nonmaleficence. My own personal guiding principles were to: always respect cultural differences and to treat people respectfully and equally; always be aware of the legal and regulatory norms of the area in which my research will be done; prevent corrupt practices or professional misconduct; deal fairly with the intellectual property or research support of others; avoid plagiarism; retain independence and impartiality in my research; and to re-consider my ethical principles when faced with new or changing ethical challenges. Throughout my fieldwork, I constantly reminded myself to be humble, and open-minded, as research in the rural global south is often criticised for being exploitative (Chambers, 1997).

As described above, I conducted my research with a small team of research assistants. Before any of them began any research, I held a two-day training course, part of which was spent discussing the relevance and importance of research ethics, particularly as they concerned participant privacy, and confidentiality. As I also described above, both in the household survey, and the interviews, all participants were provided with details about the research, had to consent to participate, and were thanked after the survey or interview with a small token of gratitude. Beyond these interactions with research participants, throughout my time in the field, I helped people when and where I could, whether it was providing them with a lift, basic medication, a small loan, or access to information about a question they had.

Aside from research that directly involved people, I was also aware that using other methods, like remote sensing, requires careful ethical consideration. This is particularly the case when land owned by an individual or group of individuals can be identified, and where changes over time can therefore be linked with individuals, which could alter power relations both within and outside the community (Fox et al., 2003; St.John et al., 2016). In the context of my study area, land is communally owned and managed, and my analyses are coarse, which makes it difficult to directly link changes to individuals. Nevertheless, this was something I was conscious of during my analysis.

2.9.2 Positionality

Positionality is an amalgamation of a researcher's personal history, cultural background, socio-economic status, race, gender, and age (Creswell and Clark, 2011). These all affect the research approach, and the positions that the people being researched assign to the researcher. With that in mind, I recognise that these could have an effect on my research. For instance, whilst my time previously spent working in Kenya afforded me many opportunities, background knowledge, and knowledge about the local context, it also impacted my positionality as an independent researcher. To minimise this, I was clear to my research participants that I was there in an impartial capacity and not working for any Kenyan government institution or parastatal (e.g. the Kenya Wildlife Service), NGO (e.g. the South Rift Association of Land Owner or African Conservation Centre), or private company (e.g. tourist lodges). Upon reflection, I think that this was influential in, for example, being granted permission to look through institutional or personal archives. I also recognise that my status as a white, male, non-native speaker of Maa, arriving from a University in the United Kingdom, will have impacted the relationships I formed with research participants, particularly given that Kenya was previously under colonial rule.

Furthermore, I also considered the positionalities of my research assistants and translator, who were all chosen for being respected community members who would be accepted into the houses of their neighbours, and for their availability. However, their positionality was likely to have been somewhat dictated by Maasai (and other local) customs in this area.

My reflections about positionality were influenced by the recommendations of Homewood et al. (2009c) who refer in particular to research on conservation related topics in pastoralist settings, particularly by researchers who might be seen to be connected to conservation. Below, I set out their most salient points as they relate to this research, and the attempts that I have made to consider these:

The formulation of research issues may miss non-conservation issues prioritized by local people. By also focussing on drought, and using mixed-methods when collecting data, I aimed to engage with other locally relevant priorities beyond conservation.

Distinguishing between the benefits and costs from conservation, accrued at different levels, and sampling biases may result in missing the very poorest and the often absent wealthiest of the community. By using a

randomised stratified sampling approach, I aimed to make it equally likely that households from different wealth levels would be included in my sample. Then, by focussing on how the wealth of the household related to other variables, I aimed to take into account at least some of these variable effects. However, identifying and targeting the absent (usually distant) wealthiest people, remained a challenge.

Inequalities of power, conflicts of interest, and a lack of understanding of research can compromise data quality for research focussing on conservation, including attitudes and perceptions. I aimed to overcome this challenge by being as transparent as possible with people about my research, and positionality, and to take time to listen to what many different people had to say to me, in both formal and informal settings.

Elites and local informants may have vested interests and unnoticeable influences in public and participatory fora. By using a mixed-methods approach which was not overly reliant on the perspectives of elites and other interviewees, I aimed to make sense of their perspectives with the results from other methods.

The call to link research to locally prioritised issues has been made by others previously (e.g. Smith et al., 2009; Reid et al., 2009). In this research, my aim was to follow Reid et al. (2009)'s suggestion of understanding the local context before research begins, and of presenting results back to the communities involved, which can then inform future local priorities and research priorities. Over a long period of time, this becomes a cycle of continual engagement with local priorities in the area[32]. Therefore, I began my fieldwork with my list of research questions, but not with a particular hypothesis to test.

[32]Ultimately, as researchers we should aim for Reid et al. (2009)'s Model 5 of continual engagement among researchers, communities, policy makers, and NGOs, but this is a long term commitment, and hard to guarantee in the context and timeline of a PhD.

The Kenyan context and study area

3.1 Introduction

This chapter introduces the study area, including a short summary of the geological, environmental, and social systems. However, I begin by giving a brief background and historical context of the Maasai people who inhabit this area. I also give a brief overview of Kenya's colonial history as it relates to the Maasai, and this research. I then provide an overview of changes in land management and tenure in post-independence Kenya. Finally, I give a brief history of area-based conservation efforts in Kenya, including the growth of community conservation areas, and I outline what these conservation efforts are attempting to conserve.

3.2 The Maasai, the Iloikop wars, and *emutai*

The Maasai people are transhumant pastoralists (and agro-pastoralists) who speak a Nilotic language (Maa), and live in southern Kenyan, and northern Tanzanian rangelands. Livestock have traditionally been central to Maasai identity, as they rely on them for both cultural and economic reasons. Livestock are used as food comprising meat, milk, and sometimes blood, to sell, or in culturally important rituals, such as marriage payments, exchanges, or gifts. Maasai people also have a long and intertwined relationship with cultivation-based people, and hunter-gatherers who either live in parts of Maasailand, or in neighbouring areas (Spear and Waller, 1993). Each of these groups traded with each other, relied on each other, fought against one another, or assimilated people from different groups during times of hardship (Berntsen, 1976).

By the 18^{th} and 19^{th} centuries Maasai pastoralism had become the dominant form of land use in rangelands across a large area of East Africa (Spear and Waller, 1993). From what we know, the territory of the Maasai was at its peak early in the

19th century. It appears to have been centred on the Rift Valley, which provided a north-south axis for Maasai communities to expand, at the expense of other pastoralist groups, cultivation-based groups, and hunter-gatherers (Galaty, 1993; Waller, 1976). For instance, there are well-documented accounts of conflicts amongst the more mobile pastoralists, and between pastoralists and more settled cultivation-based people, over sources of permanent water and grazing, during the "Iloikop Wars" (approx. 1840s-1870s; ibid.). It appears that, during this period, "maintaining sufficient number of livestock rather than access to the land was the basic objective of the production system" (Campbell, 1993:260).

Then, in the latter part of the 19th century, a series of devastating epidemic disease outbreaks which affected livestock, left the Maasai weakened and unable to hold onto their extensive grazing lands. In 1883, livestock herds in the Rift Valley were decimated by Bovine Pleuropneumonia. In 1891, an outbreak of Rinderpest, a novel disease introduced by British troops in Eygpt and Italian troops attempting to invade Abyssinia (Ethiopia), caused even greater devastation and loss of livestock, with mortality of around 90%. An outbreak of Smallpox followed in 1892 and caused widespread disease and famine among people (Spear and Waller, 1993). Taken together, this period is known by the Maasai as *emutai* (disaster), and it transformed their territory and fortunes just as colonial influence in East Africa was growing.

3.3 Colonial rule in Kenya, and the Maasai

Colonial rule in Kenya by the British began in 1895 after the declaration of the East Africa Protectorate. Any resistance to British rule at that time was met with force (Hughes, 2002). The British actively encouraged British and other European emigration to Kenya. The first government chiefs were paid in 1897, then the newly introduced Crown Land Ordinances of 1901 and 1902 declared all land in Kenya to be Crown Land and allowed for the sale and lease of land to foreign settlers. In 1906, the British set up Native Reserves (Tiffen et al., 1994). Then, after World War 1 (1914-1918), Tanganyika too became a British colony in an area referred to as British East Africa.

With regards to the Maasai living in the East Africa Protectorate, the British facilitated livestock raids against other groups like the Gikuyu (Kikuyu). Age-set spokesmen of the Maasai (*ilaiguenak*) were allowed to assemble livestock raiding groups, and then, after providing some livestock to the government, to keep a substantial

portion of the stolen livestock (Spear and Waller, 1993). In 1904, the Maasai were moved by the British colonial government into two Native Reserves, one in central Kenya around the area of Laikipia today, and another in southern Kenya around the area of Kajiado today (Hughes, 2002). However, not long after realising the potential that the Northern Maasai Reserve might have for a growing number of colonial settler farmers, only seven years later in 1911, the Maasai were coerced and moved once more to the slightly expanded, but drier, Southern Maasai Reserve[1] (ibid.).

Although the Southern Maasai Reserve was claimed to be adequate to meet the needs of the relatively sparse population, this hardening of territorial boundaries was in fact a significant curtailment to people and their livelihoods compared to their former expansive and flexible range (Campbell, 1993).

During the late 1920s and early 1930s there were severe droughts across the Southern Maasai Reserve (Anderson, 1984). These droughts provided justification to curtail supposedly unsustainable livestock herd sizes[2], and land degradation in the "Maasai Reserve" (Campbell, 1993). A host of measures followed to address these perceived problems, starting with the Kenya Land Commission of 1932, which paved the way for grazing schemes to reduce livestock numbers in the native reserves through both stricter regulations, and market access (German et al., 2017). These were unsuccessful. Following this, there was a perception that a move towards individualised land tenure would undo processes of land degradation. The pre-independence Swynnerton Plan (Swynnerton, 1955) was instrumental in the creation of individual, private ranches to commercialise agriculture (Campbell, 1993). By independence, small pockets of Kajiado District had been privatised to these individual ranches, in areas of favourable rainfall, and under careful supervision and support from the Veterinary Department (ibid.).

Therefore, the peak of Maasailand as we understand it in the 19$^{\text{th}}$ century, was split in two by the border between Kenya (Britain's East Africa Protectorate) and Tanganyika (German East Africa) in 1890[3]. Following this, the Maasai suffered widespread human and livestock deaths during *emutai*. In Kenya, Maasai territory was split in two again in 1911, before being slowly broken up and reduced over time by the colonial government who prioritised the land needs of other people, by encroachment

[1] I will cover the details of this as they relate to this thesis in greater detail in Chapter 4.

[2] Incredibly, the District Commissioner of Kajiado of that time declared that the Maasai had more cattle than at any time in their history (Campbell, 1993).

[3] This was the border agreed at the Heligoland-Zanzibar Treaty, between German East Africa, and the East Africa Protectorate. It was not officially surveyed until 1910.

from large-scale cultivation, and through the growth of an exclusionary conservation estate (Homewood, 1995).

3.4 Land management and tenure in post-colonial Kenya

After independence from Britain on the 12th of December, 1963, Kenya's former Native Reserves, such as the Southern Maasai Reserve (which included current day Kajiado County), were converted to "Trust" land, managed by local district governments, on behalf of the people living in them (Cavanagh et al., 2020). The new nation's government inherited modernisation models of development from their former colonisers, and sought to push the country to shift from subsistence to commercial farming, from communal enterprises to privatisation, and from traditional institutions of land management, to modern ones (Rohde et al., 2006; Rutten, 1992). In rangelands like much of Maasailand, these modernisation models were generally advanced through what we understand now as the "received wisdom" narratives of environmental degradation and "Tragedy of the Commons" (Hardin, 1968; Leach and Mearns, 1998; Rohde et al., 2006).

The aforementioned Swynnerton Plan (Swynnerton, 1955) provided a blueprint for modernisation efforts in rangelands. Although the individual ranches of the 1955 Swynnerton Plan were regarded as a success, after several successive severe droughts (see Chapter 4.5), development agencies such as the World Bank and USAID, and the Kenyan government recognised that individual ranches were not well suited to the more arid parts of the country, including much of Kajiado District, where mobile pastoralism, with pockets of cultivation, remained the dominant livelihood.

The Kenyan government therefore commissioned the Lawrence Land Commission, which resulted in the Lawrence Report of 1966. The recommendations of this report were that instead of individual ownership of ranches, group ownership of land, under collective freehold title, was more appropriate in Kenya's rangelands as it would allow for the mobility necessary to exploit the spatial variability in rainfall, and consequently, grazing and water (Lawrence, 1966). This new concept was termed the Group Ranch (GR), where land was collectively owned by a group of members as shareholders in the land (adult men within the boundaries of the GR). This concept was initially accepted as a way to provide greater security of land tenure, and to prevent land encroachment by the government, as well as external and internal elites (Bekure et al.,

1991; Campbell, 1993; Galaty, 1999). The intention was that each of these GRs would enclose sufficient resources to meet wet and dry season resource and water demands (Fallon, 1962 in Rutten, 1992; Davis, 1971). In practice, in bad years, migration of people and livestock well beyond the GR boundaries was often required for livestock to survive (Mwangi, 2007a; Western and Nightingale, 2004).

3.4.1 The process of adjudicating and incorporating a Group Ranch

Group Ranches (GRs) were legally established through the Land (Group Representative) Act of June 1968 (Government of Kenya, 1968; Figure 4.1). As described by Rutten (1992), the creation of a GR began with a declaration of an Adjudication Area by a group of people. Then demarcation, recording, and survey officers from the District would assist in the technical process of marking out the boundaries of the claimed Adjudication Area, which were preceded with discussions with the chiefs and elders of the area. Once these were set, this area, together with an Adjudication Committee appointed by the District's Adjudication Officer, of no less than 10 men residing in that section, were then declared an Adjudication Section. Once this was declared, any adult male could claim to have an interest in that section, and were recorded as part of the Adjudication Register, and therefore became members of the group. There was a 60-day period for complaints to be made, after which the Adjudication Register (the list of members and the map of boundaries) was sent to the Chief Land Registrar. The group members then elected no more than 10 men to apply for the incorporation of the GR in the Registrar of Group Representatives. The certificate of incorporation, and the Adjudication Register were then forwarded to the Land Registrar of the District, who would issue a group title, in the name of the group. Once the GR was issued a title, the GR members elected a GR committee who were then responsible for day to day management of the land, assets, and finances (Kimani and Pickard, 1998; Rutten, 1992).

However, as has been well detailed elsewhere (Galaty, 1994; Mwangi, 2007a; Rutten, 1992; Thompson and Homewood, 2002), the establishment of GRs precipitated land privatisation, subdivision, and sale, over the period from the late 1970s, through to today. The adjudication and incorporation process was easily corruptible to benefit elites (Galaty, 1999; Mwangi, 2007b): large areas of land with the greatest value were allocated to individuals from both within and outside the Maasai community (Galaty,

1992); committee members allocated themselves, or individuals in positions of power and influence, titles to some areas which were excised from the GR (Galaty, 1994, 1999); GR committees often did not represent the interests of the wider community, including but also beyond their members. Crucially, women, those in the younger generations, and other weak and marginalised groups were not initially included in the GR registers (Archambault, 2014).

Since GRs were established across Kenya, kleptocratic elites, the dilution of individual shareholding as populations grew, and the desire for secure individual land tenure, ultimately resulted in many GRs subdividing (Galaty, 1999; Homewood et al., 2004; Mwangi, 2007b). In some parts this process of subdividing the GRs has resulted in land fragmentation, restricting the mobility of pastoralists, their livestock, and wild animals (Herrera et al., 2014; Mwangi, 2007b; Rutten, 1992). This in turn can reduce rangeland productivity, increase inequality, push people to move away from the pastoralist way of life, and result in reductions in the number of wild animals (Boone, 2005; Boone et al., 2005; Groom and Western, 2013; Rutten, 1992). Campbell (1993) argues that the introduction of the GR was the beginning of a fundamental shift amongst many Maasai in Kenya from seeing cattle as the basis of production, to seeing land as the basis for individual advancement. Rutten's (1992:273) detailed analysis of the situation is well summed up by the following: "the Group Ranch concept was, in many respects, an artificial creation having no traditional basis, being established as a result of administrative propaganda for change and accepted by the majority of Maasai because of securing access to land", and ultimately the "outcome of Group Ranch subdivision[4] [was] disastrous" (Rutten, 1992:484).

Nevertheless, it is also important to note that a small number of GRs remain largely free of subdivision, including the two which form the focus of this thesis, Olkiramatian and Shompole.

3.4.2 Kenya's 2010 Constitution and the 2016 Community Land Act

Kenya's new Constitution of 2010 acknowledged the ability for customary tenure to produce powerful property rights (Wily, 2018). On September 21, 2016, the Parliament of Kenya passed the Community Land Act (Government of Kenya, 2016) as the

[4]To individual land titles.

principal framework through which customary rights to land would be registered. This Act repealed the Land (Group Representatives) Act (Government of Kenya, 1968) and the Trust Land Act (Government of Kenya, 1938), effectively making the Group Ranch category of land obsolete. At the time of my field work, as far as I could make out in my discussion with GR officials, and Kajiado County officials, the GR lands in Kajiado were being held in trust by the Kajiado County office until each of them was now re-registered as "Community Lands." There is a 10-year window during which GRs are to meet the requirements of the new Act, including establishing formal land use plans, so that they can complete their registration as Community Land. An analysis of the challenges and opportunities of this new Act[5] suggests that although many aspects are positive in its attempt to secure lawful customary rights to land, there are loopholes that may, once more, place some communities, and some members of communities, at risk of losing their land (Wily, 2018). Throughout this thesis I will refer to these areas as Group Ranches (GRs) as that was how they were *de facto* understood and labelled while I was conducting my research, which was before any implementation of the Community Land Act had begun.

3.5 Conservation policies in Kenya

3.5.1 Beginnings of formal conservation in the East Africa Protectorate (colony)

Formal policies which set out to manage wild animals in what was to become Kenya began in 1895, as the British Colonial government set out to control the killing of wild animals, and the trade in ivory (Cockerill and Hagerman, 2020). Their approach mainly focussed on setting up game sanctuaries or reserves, and formulating rules about the controlled exploitation of wild animals by colonial settlers.

These policies had little regard for existing local practices and beliefs, and instead regarded traditional practices, such as wild animal use and hunting, as primitive and unsustainable (Cockerill and Hagerman, 2020). This was the start of a process of separating local people from wild animals, and instead shifting custodianship of wild animals to the state.

[5]This is taken in the context of other Acts pertaining to land which have been introduced since the Constitution of 2010.

3.5.2 National Parks in Kenya

In the 1930s, the Society for the Preservation of the Fauna of the Empire (SPFE) began to lobby the Colonial office in London, to push for the introduction of National Parks in African colonies (Adams, 2004). This precipitated the setting up of Kenya's first National Parks (Nairobi in 1946, Tsavo in 1948, Mt. Kenya in 1949, Aberdare in 1950), following the National Parks Ordinance of 1945. This ordinance was the first time the rights of local communities were mentioned in colonial wildlife policy (Cockerill and Hagerman, 2020), as in theory, if communities resided in an area to be set aside as a National Park, it required the prior approval of the Native Lands Trust Board. Nevertheless, there is little evidence that local interests were considered (Kabiri, 2007).

3.5.3 Conservation in post-independence Kenya

Wildlife policies implemented by the colonial government were essentially maintained unchanged after independence (Cockerill and Hagerman, 2020). Then in 1976, the Government of Kenya introduced the Wildlife (Conservation and Management) Act (Government of Kenya, 1976), which merged the former Game Department and the National Parks Trustees into a single, government run, Wildlife Conservation and Management Department. This resulted in a ban on hunting in 1977 (Government of Kenya, 1977) and a ban on the trade in wild animals and wild animal products in 1978 (Government of Kenya, 1978). These measures were intended to reverse countrywide declines of elephant (*Loxodonta africana*) and black rhinoceros (*Diceros bicornis*), in particular. The Act of 1977 also introduced the possibility of compensation for damage of crops, property, or livestock, or indeed injury or death, caused by wild animals.

3.5.4 Kenya Wildlife Service

In 1989, the Kenyan government disbanded the Wildlife Conservation and Management Department and replaced it with a new parastatal, the Kenya Wildlife Service (KWS), which remains up to present. KWS are responsible for the management of Kenya's protected areas, and the management of >125 field stations outside protected areas. KWS are also the sole authority with custodianship over all wildlife in Kenya, including wildlife both inside and outside of protected areas, and so they began pro-

grammes which aimed to support conservation on land outside protected areas. These policies, together with significant overseas funding and support, encouraged the participation of community organizations in conservation, primarily through eco-tourism (Baskin, 1994).

3.5.5 Community conservation and the emergence of conservancies

Community conservation can aim to address any one of several aspects of social-ecological systems. In East Africa, however, most conservation policies, and community conservation in general, have focused on wild animals, and I will adopt this familiar meaning in this thesis. In Kenya, communal landowners, or individual landowners can establish conservancies, or conservation areas (King et al., 2015). These have taken several forms, but in general, they are areas set aside for the purposes of conservation and management of wild animals, and they can be categorised as: conservancies set up on community land (Group Ranch or Trust Land, now Community Land); or conservancies set up on individual private land, including cases when many individual landowners pool contiguous land. The management, rules, forms of revenue generation, and partnerships of these conservancies vary widely, but many are centred on agreements with tourism operators (King et al., 2015).

The earliest non-state protected areas in Kenya, now referred to as conservancies, were founded on private land and community land, in the 1970s, in places like Solio Ranch, Taita Hills, Kimana, Ol Chorro Oiroua. By the 1990s this model of community conservation was actively being promoted by conservation NGOs, with the support of overseas funding from donors such as USAID[6] (King et al., 2015; Rutten, 2004). Subsequently, the number of conservancies, the area they cover, and the number of wildlife they help to conserve, has grown dramatically (King et al., 2015; Western et al., 2009). By the end of 2015, there were 178 conservancies in Kenya: 120 that were established and 58 that were emerging (Bedelian, 2014). Many of these are found in pastoral rangelands of Kenya, including many parts of Maasailand, particularly in communities neighbouring the Maasai Mara National Reserve and Amboseli National Park, who continue to tolerate wild animals on their land (ibid.). In 2013, the Kenyan government formally recognised conservancies, and set out guidelines for registration

[6]They were the funders of the COBRA and CORE programmes of the 1990s that sought to expand this idea to other areas.

as a conservancy, as well as the requirements and benefits this entailed, in the Wildlife Conservation and Management Act (Government of Kenya, 2013).

Some argue that the growth of conservancies as community-based conservation (CBC) can provide financial incentives for conservation, generally through eco-tourism, and potentially improve co-existence with wild animals (Glew et al., 2010; King et al., 2015; Western et al., 2015b; Ykhanbai et al., 2014). Yet others point out that narratives and promises of CBC have fuelled conflicts by creating unachievably high expectations regarding the profitability of conservation, paired with an inability to decentralise power to community members (Nelson and Agrawal, 2008). Others still are more scathing and blame CBC for entrenching or creating kleptocratic elites who work with and for conservation organisations that they see as neo-colonial powers (Cavanagh et al., 2020; Mbaria and Ogada, 2016; Sachedina, 2008).

There are various reasons for the rapid growth in community conservancies in Kenya. Conservation NGOs are willing to facilitate this process as it brings more land under conservation management, extends protection for wild animals, and could reduce conflict between wild animals and people (Glew et al., 2010; King et al., 2015; Western et al., 2015b). Communities who participate in this process are often driven by elites who want to access grant funding, new economic gains, and potential security benefits (King et al., 2015; Mbaria and Ogada, 2016)[7]. In some cases, local people see community conservation areas as a mechanism to increase their voice in local decision making (King et al., 2015; Ykhanbai et al., 2014). Overall, research suggests that in terms of social benefits, most conservancies provide little revenue at the local level when compared to alternative land use options, and that there is little evidence of any impact on poverty reduction (Homewood et al., 2009c; Rutten, 2002; Thompson, 2009).

3.6 What are conservation attempts aiming to conserve?

The Republic of Kenya is internationally recognized for its biodiversity richness. This is partly down to the fact that Kenya straddles the equator and has incredible topographical and climatic diversity. There are at least 25,000 insect species, 7,000 plant species, 1,100 bird species, 350 mammal species, 220 freshwater fish species, 220

[7]The term "community" itself can also be loose and potentially problematic in this context, an issue I discuss later in Section 3.7.

reptile species, and 100 amphibian species (Government of Kenya, 2018). Kenya has six World Heritage Sites, six Biosphere Reserves, six Ramsar Sites, and 66 Important Bird Areas (ibid.).

As well as its own national legislation and policies, Kenya is a signatory to several multilateral environmental agreements including: the Convention on International Trade in Endangered Species of Wild Fauna (CITES), the Convention on the Conservation of Migratory Species of Wild Animals, the Convention on Wetlands of International Importance (the Ramsar Convention), the United Nations Framework Convention on Climate Change, and the United Nations Convention on Biological Diversity.

Nevertheless, despite all this nominal protection, over the past four decades, there have been steep declines in the number of large animals in Kenya. Aerial monitoring of large animals which began in 1977 shows that Kenya has seen a reduction of between 50% and 68% in many large wild mammal populations (Ogutu et al., 2016; Western et al., 2009). Only one-third of these large animals are found in National Parks and National Reserves, with the remaining two-thirds found outside protected areas (Western et al., 2009), including in the aforementioned conservancies. Yet the losses in large wild animals are occurring both inside and outside protected area (ibid.).

The reasons for these losses vary by species, and area, but the principal reason for most species is habitat loss and fragmentation, primarily as land is used by people for cultivation (Homewood et al., 2001; Norton-Griffiths and Said, 2009), as well as declining rainfall. However, fundamentally, the decreases are also related to historical and current policy and institutional failures (Homewood et al., 2001; Ogutu et al., 2016). At the same time, some recent studies suggest that the presence of community conservation areas are positively correlated with wild animal numbers, including elephants (*Loxodonta africana*; Ihwagi et al., 2015) and lions (*Panthera leo*; Elliot and Gopalaswamy, 2017).

3.6.1 Tourism in Kenya

Earnings from tourism in Kenya were KSh 163.6 billion (approximately US $1.6 billion[8]) in 2019 with a total of over 2 million international visitors (Kenya National Bureau of Statistics, 2020). The number of tourists to National Parks and Game

[8]The exchange rate used throughout this thesis is based on the 28th of February 2020 when 100 KSh = 1 US$.

Reserves in 2019 was around 3 million[9] (ibid.). This is a growing industry and foreign income earner for the Kenyan government: in 2009 tourism earned KSh 62.5 billion (approx. US $780 million at that time). Tourism has therefore been earmarked as one of the six priority sectors of Kenya's Vision 2030[10]. Although Kenya is endowed with numerous global attractions, a significant portion of Kenya's tourism is associated with wildlife viewing in both national protected areas, and non-state conservation areas.

3.7 Study Area

Kenya's Southern Maasailand offers the opportunity to investigate systems where communities manage conservation areas, in the context of changing social-ecological systems and regular drought shocks. In Kenya's Southern Maasailand, Amboseli and the Maasai Mara have been case studies for a significant body of research on the social impacts of conservation, and droughts (Bedelian, 2014; Boone et al., 2011; Butt et al., 2009; Campbell, 1999; Carabine, 2014; Homewood et al., 2009b; Jandreau and Berkes, 2016; Ogutu et al., 2014; Western et al., 2015a). The reasons for focussing on these areas are manifold and include the availability and access to data, as well as their importance in government revenue collection. However, generalising on the basis of these areas may mask changes that are occurring in other places. At the heart of Kenya's Southern Maasailand, in Kajiado County, is the cluster of GRs which belong to the predominantly *Iloodokilani* Maasai section, in an area known as the South Rift (Figure 2.1). This area is closer to Kenya's capital Nairobi than many other parts of Maasailand, including Amboseli and the Mara, but remains distant in the minds of many people, and has been poorly studied.

3.7.1 The South Rift

The South Rift is a unique geological landscape with dramatic topography (Figure 2.1). It includes the bottom of the Gregorian Rift Valley, with lowlands lying at 600m above sea level in parts, out of which the Western escarpment wall rises up dramatically to over 2,000m above sea level in Narok County. The Rift Valley floor is punctured by several volcanoes and cinder cones, including Mt. Shompole (1,567m), the Lendorog Hills (1,060m), and Mt. Olorgesaile (1,760m), with North-South fault scarps throughout the area (Owen et al., 2019), and two large soda lakes: Magadi

[9]This includes domestic tourism, and presumably does not account for multiple entries.
[10]This is Kenya's development strategy to achieve middle-income status by 2030.

and Natron, most of which is in Tanzania (Figure 3.3). Mt. Olorgesaile has been the focus of significant paleo-anthropological and paleo-environmental research (e.g. Potts et al., 2018), which has shown that hominins have lived in this area, with a plethora of extinct animal species, including close relatives of extant species, as far back as 1.2 million years ago Potts et al. (2018)[11]. The South Rift is a semi-arid zone with erratic bimodal rainfall which averages 525mm per annum, and 35% inter-annual variability in rainfall (Figure 3.1; Agnew et al., 2000, Schuette et al., 2013a). Temperatures in the dry season can reach over 45° Celsius.

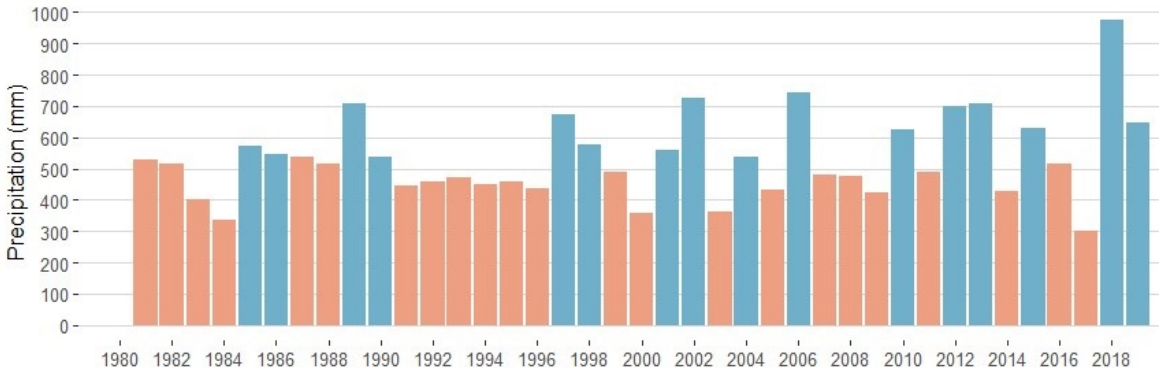


Figure 3.1 Yearly rainfall for Olkiramatian and Shompole Group Ranches, from January 1981 to December 2019, based on CHIRPS data (Funk et al., 2015a,b). Red and blue bars indicate years with a total rainfall of less than, or greater than, the 1981-2019 average, respectively.

The South Rift is believed to have been inhabited by Maa-speaking *Iloodokilani*, with pockets of more agro-pastoral Maa-speaking *Ilkurman* and *Batemi*[12], since as early as the 1700s (Sutton, 1993). Today, the South Rift is part of Kajiado County, at the southernmost tip of the Kenyan Rift Valley. Kajiado County covers an area of 21,105 km^2, or 3.5% of Kenya's land area (Kajiado County Government, 2013)[13]. The South Rift area lies in the parliamentary constituency of Kajiado West.

[11]These early humans also engaged in the procurement of rocks from distant sources, traits which indicated complex technological and socio-economic behaviours (Brooks et al., 2018).

[12]They are sometimes referred to by others as the *Sonjo*, although I have come to learn that they resent this name (Brehony, 2005).

[13]It is bordered by the United Republic of Tanzania to the south, as well as counties Narok, Nakuru, Kiambu, Nairobi, Machakos, Makueni, and Taita/Taveta.

3.7.2 Olkiramatian and Shompole

This thesis focuses on two GRs in the South Rift: Olkiramatian Group Ranch (at 21,612ha), and Shompole Group Ranch (at 62,689ha)[14], as shown in Figure 3.3 (referred to as "Olkiramatian" and "Shompole" hereafter).

Aside from the *Iloodokilani* Maasai, other groups of people also live in Olkiramatian and Shompole, including *Ilkurman* who are sometimes referred to as a "peripheral Maa group" (Kipury, 1983:1) that are semi-pastoral and subsist mainly on cultivation. Although many Maasai people strive to be livestock owners, as described above, Maasai people are also at times cultivators, hunter-gatherers, or wage workers (Shaughnessy, 2019; Waller, 1993). The socio-cultural, political and economic organisation of Maasai has been well documented (Berntsen, 1976; Jacobs, 1965; Kipury, 1983; Mol, 1996; Spear and Waller, 1993; Spencer and Waller, 2017; Waller, 1988, 1993). Current understandings are that Maasai social distinctions are formed around, among other things, gender, family, age group, Maa section, clan, location of your homestead, principal livelihood, number of livestock, level of education, and economic position.

Olkiramatian has a population density of 15 people per km^2, and Shompole has a population density of 12 people per km^2, which, as I show in Figure 3.2 is much lower than the average for Kajiado County[15]. For administrative reasons, each of the two GR are divided into two locations (East and West) and five sub-locations. The two GRs have similar governance systems, and share a single ecosystem centred on the perennial Ewaso Nyiro River[16] which runs through this area, flowing into the Ewaso Nyiro (or Shompole) swamp, before ending up in Lake Natron. The area also has four other smaller, permanent rivers flowing off the rift valley escarpment (Figure 3.3a). There are several natural and man-made dams throughout the area, although these typically run dry in the dry season. Three water pipes carry water from the Oloibortoto, Sampu, and Pakaase rivers to various waterpoints across the landscape (more on this in Chapter 4; Appendix F.6 gives percentages of household water sources compared to Kajiado, and Kenya). However, the unique geological landscape etched with rivers, has

[14]Aside from this, a further 1,182ha of land in Shompole (ostensibly not part of the GR) are under public ownership by Kajiado County, and a further 716ha of land in Olkiramatian (ostensibly not part of the GR) are under public ownership by Kajiado County (formerly Olkejuado County Council) and 5,629ha are under private ownership by Ndumuna ole Giole, Nana ole Nteetu, Nkanuma Ole Lemorora, and Daniel Ole Musenya. Some of this land has since been sold on and the land is in fact occupied by *Ilpurko* following a lengthy land dispute which is discussed briefly in Chapter 4.

[15]This average is driven up drastically by the Nairobi suburbs of Kiserian and Kitengela.

[16]It only runs dry in severe droughts, although this may be happening more frequently as upstream water abstraction for irrigated cultivation increases.

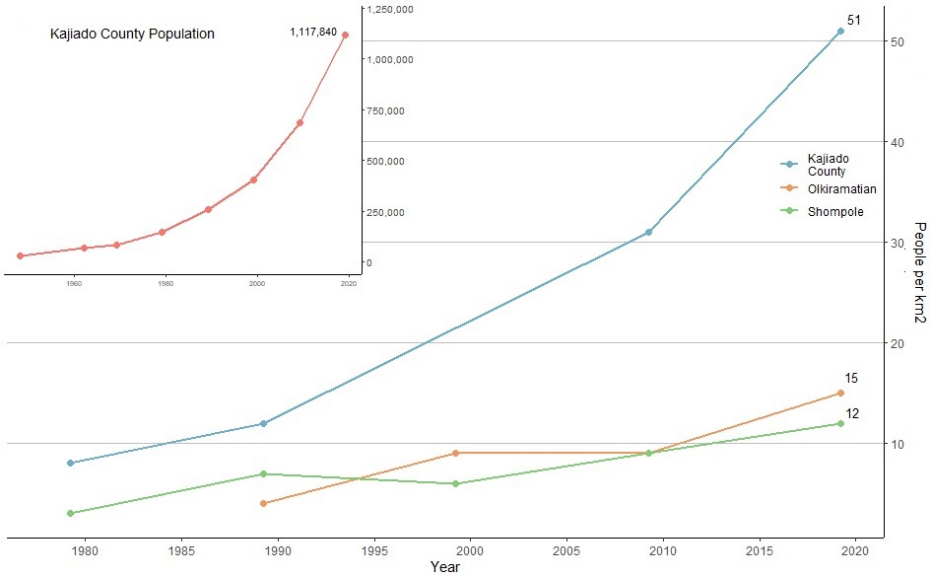
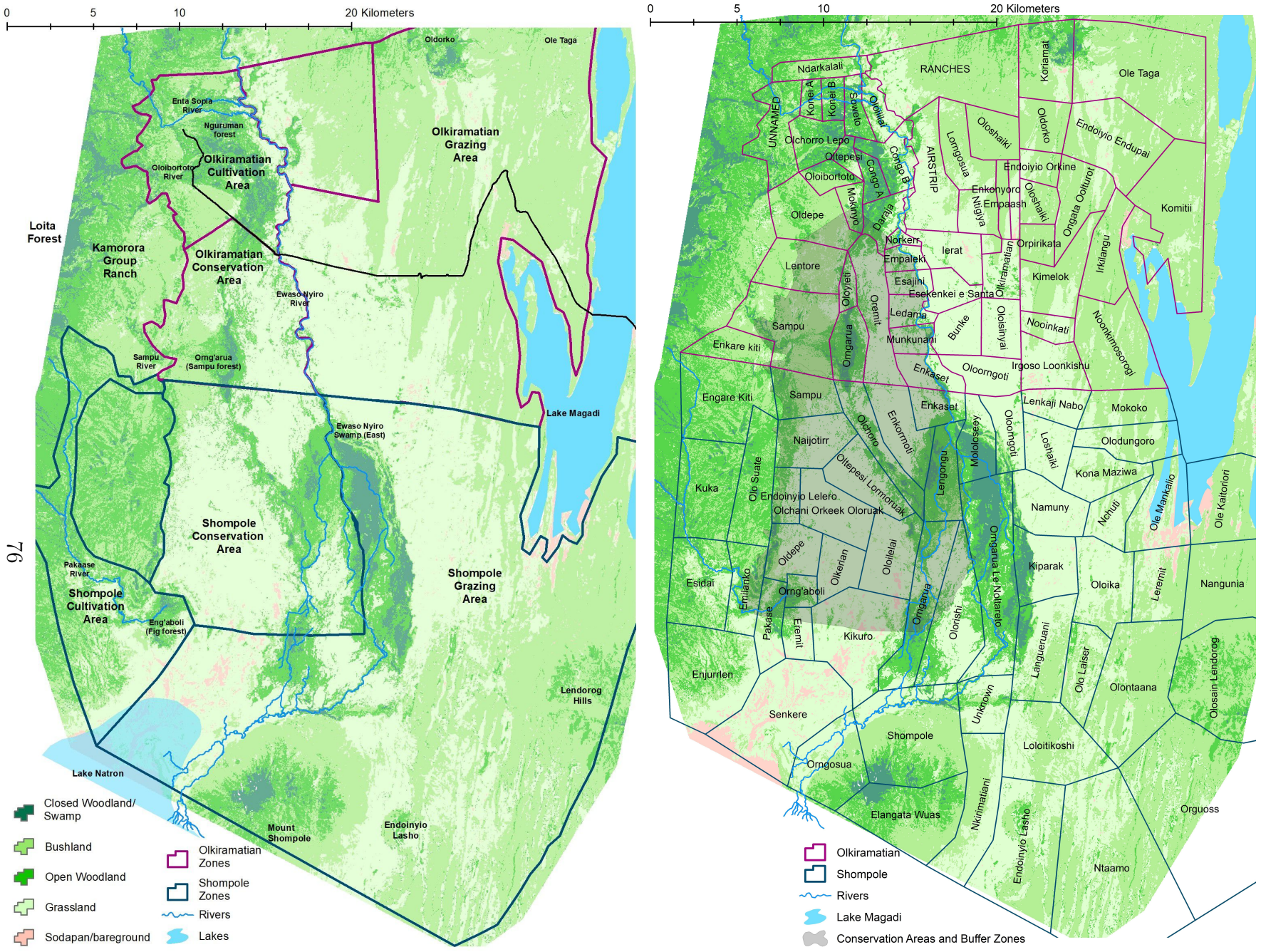


Figure 3.2 Changes in population density in Olkiramatian and Shompole from 1979 to 2019. An inset chart shows the total population of Kajiado County from 1948 to 2019. Data are from Kenya's National Census reports of 1948, 1962, 1969, 1979, 1989, 1999, 2009, 2019.

created a mosaic of habitats, from arid soda flats in the hot dry lower elevations, to open grasslands, savanna, thick bushland, mature woodland (mostly *Acacia tortilis*), and even montane forest at higher elevations[17].

The dominant livelihood source of many households in Olkiramatian and Shompole is pastoralism, although most households have diversified livelihoods to include cultivation, wage labour, or small enterprises. Livestock populations in the area are around 52.2 - 59.1 sheep and goats per km^2, and 6.2 - 15.8 cattle per km^2 (Russell et al., 2018; Schuette, 2012). Each of the two GRs have designated cultivation zones where local inhabitants, regional immigrants, and seasonal workers grow irrigated and rain fed food and cash crops. The cultivation area in Olkiramatian is supported by the Oloibortoto and Entasopia Rivers, and the other, in Shompole, is supported by the Pakaase River. More recently another area of irrigated cultivation began (or potentially was restarted) on the Sampu River, up the escarpment (see Figure 3.3a). In these areas of irrigated cultivation there are mixtures of food crops, cash crops, and many include some form of plant and tree agro-ecology.

[17]Descriptions of land cover types and their classification, as well as long term land cover change as part of the focus of Chapter 6.



(a) Map of land use zonation, rivers, lakes, and land cover. Important place names which are referred to in the text are also given.

(b) An approximate map of location names as they are referred to by local people.

Figure 3.3 Maps to show the location of rivers, lakes, place names, and land uses, for Olkiramatian and Shompole.

As described in Chapter 2.5, I created a Wealth Index for households in both GRs. Some of the data used in the Wealth Index are listed alongside Kajiado and Kenya National Statistics in Appendix F, however, it is also useful to present some of these data here. For instance, Appendix F.1 shows asset ownership for households in Olkiramatian and Shompole, compared to Kajiado and Kenya National statistics. Some assets are owned by a higher percentage of households compared to the Kenyan average. These include mobile phones which are owned by 93.6% (Olkiramatian) and 93.7% (Shompole) of households, compared to the Kenyan average of 47.3%, and motorcycles which are owned by 19.0% (Olkiramatian) and 18.6% (Shompole) of households, compared to the Kenyan average of 9.2%. Other assets are owned by a smaller percentage of households compared to the Kenyan average, such as televisions which are owned by 18.9% (Olkiramatian) and 5.6% (Shompole) of households, compared to the Kenyan average of 40.7% and cars which are owned by 2.1% (Olkiramatian) and 1.7% (Shompole) of households, compared to the Kenyan average of 6.3% (see Appendix F.1 for more). The use of durable and costly roof and wall materials such as iron sheets, tiles, bricks, or cement by households in Olkiramatian and Shompole has increased drastically over the past two decades. However, compared to the Kenyan average, the percentage of households using these materials remains much lower, but this may also be linked to higher levels of transhumance (Appendix F.2 and Appendix F.3).

Most heads of households in both GRs have not completed any formal education (71.9% in Olkiramatian, and 77.7% in Shompole; see Appendix F.4 for more) although, this looks set to change, based on data on school attendance as a percentage of population for Kajiado West, from the 2019 census (Government of Kenya, 2019), shown in Appendix F.5.

3.7.3 Wildlife, conservation, and tourism

There is no government protected area in the South Rift. Nevertheless, the ecosystem supports high densities of wild ungulates comparable with state protected areas in southern Kenya and northern Tanzania (6.7 - 7.4 Grant's gazelle (*Nanger granti*) per km^2, 6.7 -10.0 Burchell's zebra (*Equus quagga*) per km^2, 3.3 - 5.2 wildebeest (*Connochaetes taurinus*) per km^2, 1.5 - 4.3 impala (*Aepyceros melampus*) per km^2, 1.0 - 1.3 giraffe (*Giraffa camelopardalis tippelskirchi*) per km^2 - all from Russell et al., 2018 and Schuette, 2012) as well as several hundred elephants (*Loxodonta africana*) (Ahlering et al., 2012). The area also supports 22 species of carnivores, with densities

of lions (*Panthera leo*) which are comparable or greater than state protected areas in southern Kenya and northern Tanzania (13.1 adult lions per 100 km^2; Schuette, 2012).

This area is not on Kenya's "tourist circuit." However, each GR has designated a portion of their land as a "conservation area". In this thesis I will refer to these as "conservation areas" as that is the terminology used by locals in Maa and Kiswahili, in which they say *"konsapeshon"*, a phonetic translation into Maa of the English word "conservation". Within these conservation areas there are (at the time of writing) two operational tourist lodges with a limited number of tourists every year. The conservation areas are also regarded as important late dry season and drought grazing refuges (Russell et al., 2018). However, the decision-making process about the use of these areas is still unclear, which is the focus of Chapter 4.

Altogether, using the social-ecological systems perspective described in Chapter 1, the components of the South Rift social-ecological system can be usefully conceptualised by the schematic in Figure 3.4.

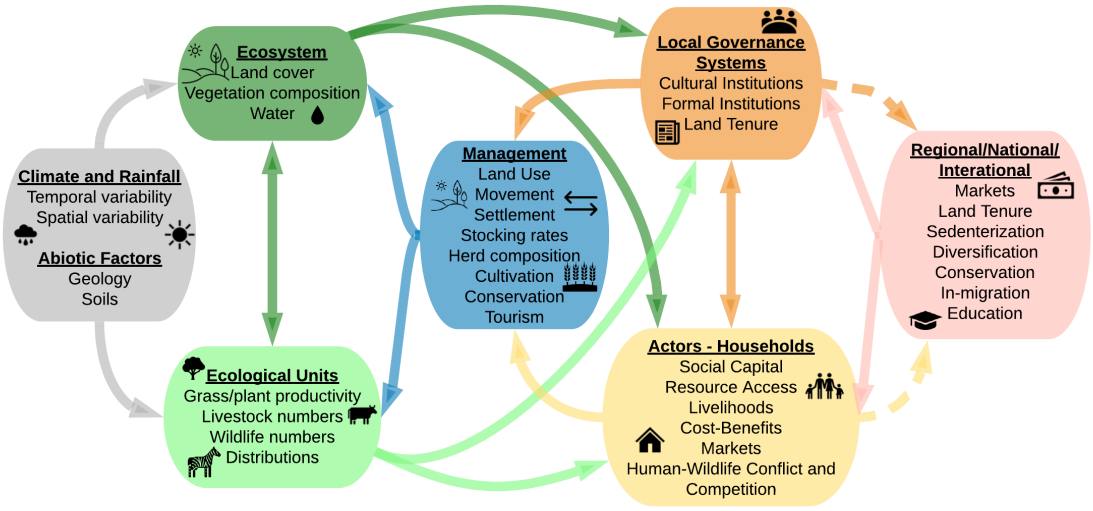


Figure 3.4 A schematic representation of the interactions and feedbacks within the social-ecological system of the South Rift, based on ideas presented in Reid et al. (2014) and Homewood et al. (2009b).

3.7.4 Defining the community

As Agrawal and Gibson (1999:635) point out, "all communities are imagined communities" and not a whole. They are not a bounded group of people, but rather constructed, and subject to boundary work. In this thesis, I use the heuristically useful term "the community" to refer to the totality of people living within these two GRs. This is in a sense, the local community, but there is an important distinction with regard to land tenure in these GRs between people who are registered members of the GRs and their families, and those who are not registered members[18]. However, "community" in this context refers to a group of people who share the same geographic spaces, have relatively similar beliefs, and homogenous social structures (Agrawal and Gibson, 1999).

3.7.5 Comparison with similar areas in southern Kenya

Some characteristics of this area make it distinct from other parts of Kenya's Southern Maasailand which have received greater research attention. In the areas surrounding the Maasai Mara, GRs have completely subdivided and some have formed conservancies as a collection of leased individual land parcels (Bedelian, 2014). Furthermore, the research of Homewood et al. (2001) in the Mara showed that land use and livelihood changes were heavily influenced by the growth of large-scale mechanised cultivation projects, due in part to higher rainfall. This land use is a significant driver of social-ecological change as it competes directly with pastoralism and conservation. This is very different to the South Rift where the two GRs mostly remain un-subdivided, and where rainfall is much lower.

The South Rift ecosystem is more akin to that of Amboseli. As in the South Rift, an important swamp lies in the heart of the Amboseli basin, which traditionally provided dry and drought season grazing and water for livestock and wild animals. In 1977 Amboseli's swamp was enclosed by a National Park, denying pastoralists access (Western and Lindsay, 1984). This effect continues to play an important role in the social-ecological system resilience to drought of this area as was well documented in the wake of the devastating 2009 drought (Carabine, 2014; Western et al., 2015a). However,

[18]Registered members (and depending on the by-laws or constitutions of the GRs, their families) are those who have shares in the land. In a sense, they are legally recognised land owners, and importantly, have a vote to cast when it comes to selecting the management committees of the GR. That is not to say that non-members are not part of community, or have no agency, but they do not have a vote, and do not have legal rights to the land.

although the system dynamics may have once been similar, the recent history, and current configuration of the South Rift social-ecological system is quite different, as I will go on to describe in the rest of this thesis.

3.8 Summary

As outlined above, the context of the Maasai, land management and tenure in Kenya, and the trajectory of conservation in Kenya, have all undergone significant changes over the last century. In particular, many Maasai (but others too), have faced a long-term process of land alienation, through a number of processes.

With respect to conservation in Kenya, there has been a shift from focusing on conservation in strictly protected areas, towards conservation in land beyond protected areas. The summary of the emergence and growth of community conservation in Kenya, will help to contextualise the research on community conservation areas and resilience to drought that I will examine in this thesis.

Historical context and the provenance of conservation in the South Rift

> "Everyone 'knows' the Maasai ... or so we think."
>
> — Spear (1993:1)

4.1 Introduction

To interpret current social and ecological systems, we first need to understand the historical context within which the social-ecological system is situated. Such an approach is inherently important as a historical reflection, but also forms the foundations for any further analyses of current social-ecological dynamics.

My purpose in this chapter is to understand the historical context of droughts and conservation in Kenya's South Rift. To achieve this, I have broken down this aim into the following research questions:

1. What is known about major historical disturbances to the social-ecological system in the South Rift, particularly changes to livelihoods and land tenure over time?
2. What is the historical context of droughts in the South Rift?
3. What is the historical context of conservation in the South Rift?
4. What led to the formation of Olkiramatian and Shompole conservation areas?

To answer these questions, I combine data from interviews with members of the community; interviews with others who were involved in setting up the conservation areas; research articles and other documents retrieved in various archives (kept by institutions and individuals). My insights were further enriched with analyses of

aerial photography, historic maps, some data from my household survey, and other information gathered during my own interactions with people recorded in my research diary.

Following these guiding research questions, the chapter is broken down into two main sections[1]. I begin by looking back at the historical context of livelihoods, droughts, conservation, and the impact of changing land tenure in the South Rift. In doing so, I aim to show that people in the South Rift have been pastoralists and cultivators for at least the last century and a half. Settlements existed across the landscape, with some people cultivating areas suitable for irrigation near the escarpment, and others spread across the rangelands to the east. However, the area on the west side of the Ewaso Nyiro had high densities of tsetse fly and was consequently only occasionally used as a drought grazing refuge for livestock. Wild animals were present across the landscape, but especially in the area to the west of the Ewaso Nyiro. This means that the acceptance of conservation areas did little to change how people used the landscape.

Moving forward in time, I aim to show that, as the push to develop a protected area estate founded on spatial separation grew in Kenya, the South Rift was an area on the periphery, and was left out.

I also show that droughts which occurred in the South Rift during the colonial period were severe and are still vividly recalled. These droughts were named and the coping mechanisms used are still sharply retold. These droughts were also significant in that they resulted in changes to land tenure in Kenya's rangelands, which eventually resulted in the formal titling of land in the South Rift as collectively owned Group Ranches (GRs). Finally, by looking back we also learn that the Magadi Soda Company (MSC) was responsible for significant ecological changes in the South Rift. They did this by: felling trees from large swaths of the land; abstracting hundreds of thousands of litres of water a day for their factory operations; redistributing water access points so that water was available year-round in several places where this had not been the case. These facts are crucial for further analyses of changing land cover, or settlement patterns, which may otherwise be misinterpreted (see Fairhead and Leach, 1996).

It is in this historical context that community-based conservation emerges in the South Rift. The second part of this chapter gives a more detailed overview of the provenance of conservation areas in the South Rift. Several actors from both outside the

[1]Refer to Figure 4.1 to trace through the overall timeline and storyline.

community, as well as within, were important in the process of setting up conservation areas, and eco-tourism projects. What resulted from this were a series of eco-tourism style enterprises, tied to conservation. Each of these early initiatives showed promise, before falling apart in the face of complex struggles over modernisation, tradition, and power. Nevertheless, the conservation areas, and eco-tourism initiatives continue to exist today, having emerged through these crises, conflicts, and contestations.

4.2 The South Rift in the pre-colonial era

There are several mentions of the South Rift, in the pre-colonial European accounts of trade caravans, and the reports of the first European travellers into these areas.

Jacobs (1968) recounts that the earliest mentions of the South Rift are found in Krapf's (1854:27-30) "Vocabulary of the Engutuk Eloikob" who mentions two Swahili caravans which go through the South Rift on their way to Naivasha, passing through Engaruka, Gelai, Pagasi (now known as Pakaase), Ewaso Nyiro, Utimi (now known as Nguruman), Ndasekera and Mosiro. These caravan routes are described in more detail in Wakefield's (1870:306-307, 312-313) "Routes of Native Caravans from the Coast to the Interior of Eastern Africa" where they refer to "Ngurumani" as an area just north of Oldoinyo Sambu[2], where inhabitants are "poor *Wakwavi*[3]", but others called them the *"wangurumani"*. They were estimated to be around 1000-1500 people, who were described as practicing irrigated cultivation and possessing no cattle. Wakefield (1870) also mentions that Engare Kiti was also a principal settlement area. The same details are also described by Farler (1882). No mention is made of the pastoralists who lived in the areas to the east, because at that time Maasailand was understood to be a collective entity inhabited by pure pastoralists.

As noted in Chapter 3, Maasailand was then hit with an outbreak of Cholera in 1869, causing "dreadful mortality" (Jacobs, 1965:45; Figure 4.1). In the 1870s war broke out in other parts of Maasailand, particularly Laikipia, which resulted in the defeat of the ilLaikipiak (Galaty, 1993; Shaughnessy, 2019; Sobania, 1993). Following this, in 1883, Gustav Fischer, the first European to venture across Maasailand[4], walked through

[2]This is more than likely the area that is now called Pakaase, and not the area called Nguruman today, as this was known as Utimi, and was over 30 km to the north.

[3]This was the general Kiswahili term used at that time for Maa-speaking agro-pastoralists.

[4]Many, particularly native English speakers, mistakenly assume that Thompson was the first person to walk through Maasailand. The distinction here is supposedly, in that colonial mindset, that Fischer did not make it across Maasailand, Thompson did.

the South Rift, following the Swahili caravan routes. Fischer recalls (1884a:75-76,199-200; 1884b) that they camped on the Pagasi (*sic*) River (now spelt Pakaase River) for several days in April 1883 during their attempt to reach Naivasha. He describes the people of Pakaase as "peaceful ... agricultural *wakwavi*" who cultivated maize and beans in irrigation furrows, and were interdependent with their neighbouring pastoralists. He notes that they possessed little livestock, "mainly sheep and goat", and that they were regularly affected by elephants (*Loxodonta africana*) and black rhinoceros (*Diceros bicornis*), and tsetse flies[5]. He too mentions the presence of "small agricultural *Wakwavi* colonies" at Utimi (now known as Nguruman in the Olkiramatian cultivation area) and Engare Kiti near Sampu River (see Figure 3.3a for all the aforementioned locations).

In the late 1880s and the 1890s, after Fischer had passed through, the people living in the South Rift (and beyond), were assaulted by an succession of disasters including Bovine Pleuropneumonia, Rinderpest, and Smallpox (Spear and Waller, 1993; Figure 4.1) during a period that the Maasai refer to as *emutai*[6]. Of these, Rinderpest, which struck Maasailand in early 1891 (Kjekshus, 1977; Waller, 1988) devastated large herds of livestock (and wild animals too) to small fractions of their original sizes and broke the economic backbone of many of the most prosperous communities, altered social systems and undermined established authorities and status structures. Then Smallpox compounded the tribulations of the already ravaged societies. Stuhlmann (1892:188) reported that these ravages caused widespread famine, and that some pastoral Maasai took "refuge with the agricultural tribes," or turned to hunting and gathering to survive (Waller, 1976).

Over the next few years, a number of other European travellers followed the Swahili caravan route through the South Rift, including Oscar Newman in 1893 (Newman, 1895), Max Schoeller and Hans von Trotha in 1896 (Schoeller, 1901; von Trotha, 1897), Ernst Kohlschutter in 1900 (Kohlschutter, 1901), Carl Uhlig in 1904 (Uhlig, 1909) and then G.E. Smith in 1904 (Smith, 1907). Smith does not remark much about the after effects of Rinderpest, famine, and Smallpox, but instead that in Pakaase he found an area "well-watered by permanent streams", where people "cultivate ... [with] primitive irrigation ... [and] keep sheep and goats, but have no cattle", that they "claim to supply the whole Maasai tribe with calabashes" and that they were "a definite branch of the main tribe [Maasai]"(1907:258 in Jacobs, 1968).

[5]When tsetse flies were more numerous cattle are exposed to Trypanosomiasis which can result in heavy livestock production losses and mortality.

[6]Translated as "disaster."

Given that these early written records are from a distinctly colonial mindset and perspective, they need to be interpreted with care. However, what these records suggest, is that this area was an important stop-over point for trade caravans and early travellers, providing fresh water and food for the large caravan contingent. This trade with caravans may have represented an important market for people living in these areas, as Adams and Anderson (1988) have argued was the case for the Maa-speaking irrigation cultivators at Lake Baringo, around the same period. In fact, Jacobs (1968) speculates that this may be where Pakaase got its name; the Kiswahili word *mpagazi*, caravan porter. It is also clear that irrigated cultivation was practiced at the base of the Nguruman escarpment, by Maa speaking people who also kept livestock, and that this group interacted with the more pastoral Maasai who lived in the lands around them.

Although the South Rift was clearly an important stop-over point for early trade caravans, as the boundaries of Kenya and Tanganyika were increasingly hardened during the colonial period, the South Rift became an area on the periphery. Far away from these lands, the British were tightening their grip on British East Africa; they declared the British East African Protectorate in 1895, and then followed this with the Crown Land Ordinances in 1902 (Hughes, 2002). As the people of the South Rift continued with their lives and practices, they were met with new realities, dictated through terms set by their new European colonisers. In the South Rift, the establishment of Maasai reserves had a significant impact in restricting and dictating land tenure (Mwangi and Ostrom, 2009).

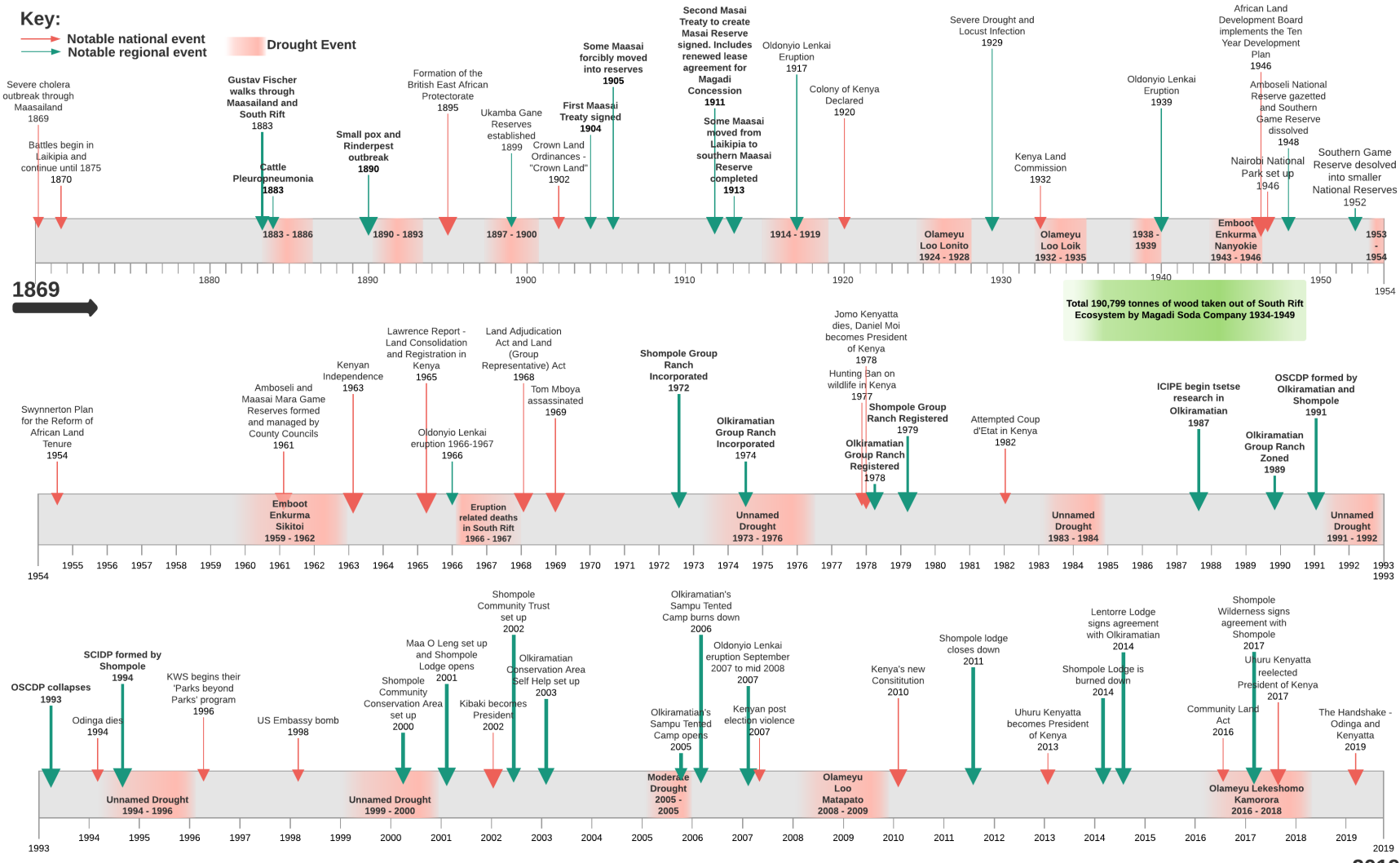


Figure 4.1 Timelines of significant historical events concerning conservation and drought in Kenya, and the South Rift (data from: I8, I12, I13, I14 I16, I26, (Bekure et al., 1991; Downing et al., 1989; Finch and Western, 1977; Homewood and Lewis, 1987; Hughes, 2002; Jacobs, 1965; Kenya Wildlife Service (KWS), 2010; Nkedianye et al., 2011; Oba, 2001; Rutten, 1992; Sindiga, 1984; Southgate and Hulme, 2000; Talbot, 1972; UNEP and Government of Kenya, 2006; Willis, 1999). Note that the names for the 2009 drought and 2017 drought are suggested based on interviews with local elders. See Table 4.1.

4.3 The Maasai Agreements

In August 1904, the Commissioner for the East Africa Protectorate Donal Stewart signed the first Maasai Agreement, with men he took for Maasai chiefs (they were not chiefs, but *iloibonok*[7]). In this treaty, it was agreed that the *Ilpurko*, *Iloitai*, *Ilkeekonyokie*, *Ildamat*, and *Iloitayok* Maasai *iloshon* (sections) would be moved to a Northern Reserve and the *Ilkaputei*, *Ilmatapato*, *Iloodokilani*, and *Ilsikirari* Maasai *iloshon* would occupy a Southern Reserve (Hughes, 2002). With regards to the territory of the *Iloodokilani*, the Southern Reserve only went up to the Ewaso Nyiro River, but did not extend to the west side of it, where the conservation areas are situated today (Hughes, 2008).

This state of affairs did not last long. The second Maasai Agreement was signed in 1911 with the new Governor of the East African Protectorate Edouard Percy Cranwill Girouard, and many Maasai were moved once more (Figure 4.1), this time out of the Northern Reserve, and into an extended Southern Reserve (Hughes, 2002). The newly included areas of the Southern Reserve meant that the area to the west side of the Ewaso Nyiro (current conservation areas) were now part of the Maasai Reserve (Kenya Land Commission, 1933).

In the original 1904 Agreement, it was also agreed that the East Africa Syndicate would have a 20-year lease to work the soda deposits over an area of 89 square miles (approximately 230km^2), covering all of Lake Magadi in the South Rift (Hughes, 2008). By the second Agreement, this lease was surrendered and instead they were issued with a new 99-year lease, which included a clause granting the lessees permission to draw water from the Ewaso Nyiro River (ibid.). As I describe below, this lease went on to be held by the Magadi Soda Company.

In the context of social-ecological system change, the repercussions of these forced moves, and loss of land, were increased vulnerability. The extended Southern Reserve that the Maasai were moved to were an inferior substitute for the northern territory, with less rainfall and fewer permanent water sources (Hughes, 2002) than those of Laikipia's highland *osupuko* (highland grazing areas). In her detailed historical account of this, Hughes (2002:372) concludes that "in evicting the Maasai from the Rift Valley and Laikipia, the British clearly perpetrated a great injustice which has repercussions to this day".

[7]Loosely translated as prophet or ritual expert.

4.4 South Rift on the periphery: colonial conservation estate in Kenya

It was also during the early colonial period that the Kenyan administration's Game Department began planning out area-based (spatial) conservation interventions. In southern Kenya, they set aside the Ukamba Game Reserve in 1899 (Adams, 2004; Figure 4.1), which was then modified and referred to as the Southern Game Reserve by 1910[8] (Figure 4.2; see Adams (2004) for more). As with the Masai Reserve (*sic*) of 1904, the reserve did not include the west side of the Ewaso Nyiro River within its boundaries, the same area which today contain the highest densities of wild animals in Kajiado (Schuette et al., 2016; Tyrrell et al., 2017) outside of the Amboseli ecosystem.

In the 1930s the Society for the Preservation of the Fauna of the Empire (SPFE) began to lobby the colonial government fearing that if hunting practices were to continue, many of East Africa's large mammals would go extinct (Adams, 2004; Hingston, 1930). The Southern Game Reserve was declared by Hingston (1930:40) to be "probably the finest piece of game country in the world." He hoped to raise the status of the reserve to a national park. However, given it overlapped with the Masai Reserve (*sic*), there was little possibility of securing title to the land. Hunting was forbidden within the Southern Game Reserve without the permission of the Game Warden, which "put the European poacher (who used to do most of the killing[9]) out of business" (Caldwell, 1938:23). The Southern Masai Reserve had been declared a closed district in 1906, under the Outlying Districts Ordinance (1902), which meant that entry by Europeans was only allowed under permit, which in a sense, offered the Maasai security of tenure, when compared to the fate of many other pre-existing societies across Kenya. Across Kenya, from the 1900s to 1940s, there were large losses in wild animal populations as land was cleared for European settlements and large-scale farms (Beard, 1988).

National Parks began to be gazetted in Kenya in the 1940s. The SPFE felt that people should not be tolerated in National Parks (Adams, 2004), echoing the wilderness ideals which emerged from the American preservationist movement (Adams and McShane, 1992). This marks a key transition from seeing European farmers and hunters as the principal threat to wild animals, and local African people as more or less

[8]Encompassing an area "as big as Wales" according to Keith Caldwell Game Warden, Kenya in 1938 (Caldwell, 1938).

[9]See Journal of the Society for the Preservation of the Fauna of the Empire, XXXIV for a report on Cottar's Safari Service charged for hunting and killing game animals in the Masai Reserve (*sic*) during the hours of darkness without consent of Game Warden (Author, 1938).

harmless, to then seeing indigenous African people as the main threat (Adams, 2004). In Kenya, the colonial government accepted that practices of indigenous Africans were a threat to wild animals and that they therefore needed to be removed from these areas. The National Park Ordinance of 1945 in Kenya allowed land to be alienated exclusively for wildlife conservation and the first National Park, Nairobi, was created not long after, in 1946 (Brockington, 2002), soon followed by others like the vast Tsavo National Park in 1948. These areas enclosed water and pasture resources, some of which were critical during dry and drought periods, that were seasonally used by the Maasai and other pastoralists.

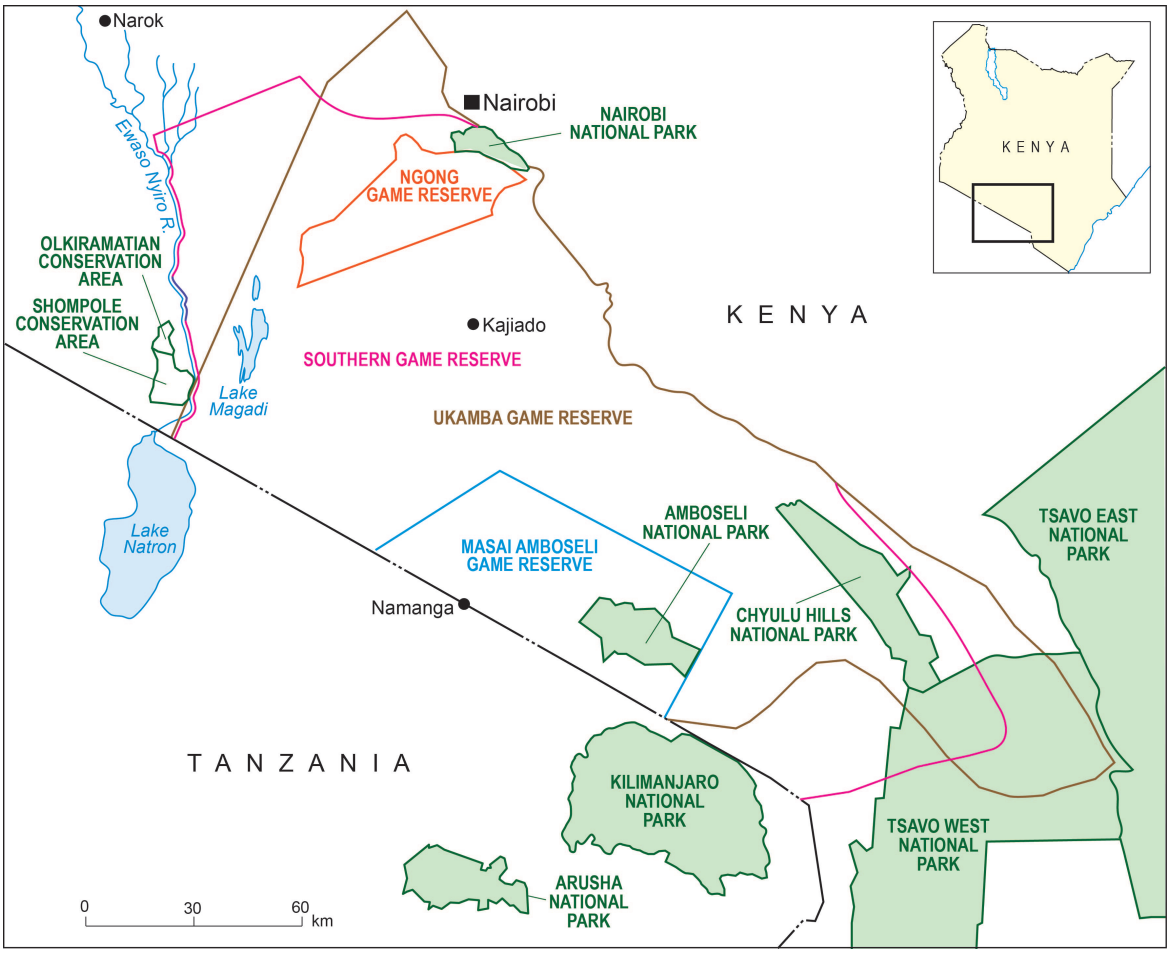


Figure 4.2 Protected areas of South-Central Kenya over the last century. Areas in green represent existing protected areas. For others, Ukamba Game Reserve Boundaries from map by Public Works Department 1907, Southern Game Reserve Boundaries from map by Survey Department of East African Protectorate 1910, Masai Amboseli Game Reserve Boundaries from map by Survey of Kenya 1959 and National Atlas of Kenya 1970, Ngong Game Reserve from map by Survey of Kenya 1959.

In 1952 the Southern Game Reserve was replaced by three smaller National Reserves within which livestock presence was tolerated (Kabiri, 2007). In 1961, Amboseli and Maasai Mara were converted to game reserves, under the County Councils (Figure 4.2) and the rest of the Southern Game Reserve was turned into a "Controlled Area" where hunting was allowed with a permit, until the ban on hunting in 1977 (Rutten, 1992).

Although during this period the South Rift is described as "one of the few remaining good shooting areas of Kenya" by Capt. Keith Caldwell (Caldwell, 1950:16), this entire area, including Lake Magadi, the Ewaso Nyiro, and the Nguruman Escarpment more or less escaped the attentions of the conservationists of that time and were not part of this wave of gazettements. It was an area at the periphery, a frontier; it bordered Tanganyika to the South, Narok to the West, and was only accessible along one dead end road through Magadi town. It was hot, dry and dusty, and remained unattractive to most tourists.

Therefore, to understand the historical context of conservation in this social-ecological system, it is important to note that the South Rift came through the colonial period, and into the post-colonial period, in a unique way, only occasionally used by hunters of large mammals and birds by hunters, but generally managed by the same people who lived there. The former Director of the Kenya Wildlife Service (KWS) from 1994 to 1998, summed this up in an interview (I45): "here's what I see as important about the South Rift, it's off the radar ... you don't have that intense eye of government looking and saying we need to establish a reserve here."

4.5 "Droughts of our fathers"

Four drought events are vivid in the memories of the elders in the South Rift from the period between signing of the 1911 Maasai Agreement, to Kenyan independence. Each of these droughts is remembered by the unique names that they were given (Figure 4.1; Table 4.1). Some of these accounts are maintained within the oral culture, and others are eye-witness accounts. The naming of these periods helps to clarify exactly when they occurred, how severe they were, and their social and ecological repercussions. During subsequent discussions it became clear that since the 1970s, droughts have not been given names, making it difficult to pass on any information about these periods.

The first significant drought of the colonial period that was vividly recalled was *Olameyu Loo Lonito* (drought of the hides), from 1925-1927 (Figure 4.1). Although

Sindiga (1984) reports that the District Commissioner reported 15% losses of livestock over this drought, interviews with elders who recall stories about this drought (I12, I13, I37) suggest it was much more severe. People were so hungry that they boiled up hides of wild animals and livestock to eat them and drink the broth (Table 4.1). They also report that many people sold or exchanged animal hides for food, something Sindiga (1984) also reports.

The next significant drought event, from 1933-1935 (Figure 4.1; Table 4.1) was "worse than any other" (I26) when many livestock and wild animals died and "only the birds were left in this land" (I37). Maasai called this drought *Olameyu Loo Loik* (drought of the bones), as elders (I8, I12, I13, I16, I26, I37) retell of people boiling up the bones of livestock and wild animals to drink the broth, or selling the bones to collectors who would grind them up[10]. Many people killed and ate wild animals (I8, I12, I26, I37) and some also sold ivory to recover their livestock herds after the drought (I13). The DCs for Narok and Kajiado respectively reported that: "grazing is almost non-existent" and "grazing ... is becoming scarce" (Kenya Land Commission, 1933). Southgate and Hulme (2000) and Downing et al. (1989) confirm that there was widespread famine over this period, from southern Kenya up to Baringo (Table 4.1).

The next significant drought period was called *Emboot Enkurma Nanyokie* (season of the red flour), from 1943-1946 (Figure 4.1; Table 4.1) when people survived by eating a red flour (sorghum and /or millet) at a time when there was widespread famine (Downing et al., 1989). The origins of this flour is not clear but one interviewee (I8) retold how the flour was provided by the Batemi (sometimes referred to as the Sonjo)[11]. Another interviewee (I13) suggested that the flour was brought in from Tanganyika but provided by the Germans. Either way, the flour helped people to survive (I12, I16), while many livestock died, and those who survived travelled to Oldonyo Gelai in Tanganyika (I16).

The last named drought period which remains in living memory is *Emboot Enkurma Sikitoi* (season of the yellow flour), from 1959-1962 (Figure 4.1; Table 4.1). Some of my informants who lived through this drought called it "the worst" drought they have experienced (I13). Many livestock died. Most households had moved to live on the west side of the Ewaso Nyiro River (Figure 4.3) and were then stuck when the Ewaso Nyiro River burst its banks once torrential rains and floods started, covering the bridge

[10]It is not clear for what purpose.

[11]A cultivation based people who now live predominantly to the east of Wasso town in Northern Tanzania.

built by the Magadi Soda Company, the sole one across the river. The only way to provide people with food, was from the air (I16, I37). Elders (I8, I12, I13, I14, I16, I26, I37) vividly recall relief food, including yellow corn, cooking fat and ground dried meat, being dropped into *enkangs* from planes and helicopters, as well as by truck. The relief food was delivered by the Kenyan colonial government, but was from "the Americans", and lasted several years for some families. Wild animals were not eaten during this drought because local people thought that the wild animals had a disease, but some households went to cultivate with the Batemi (sometimes referred to as the Sonjo) on the Nguruman escarpment (I37). Accounts reported in Talbot (1972), Downing et al. (1989), and Willis (1999) corroborate this picture, with reports of 50-80% livestock losses, widespread crop failure, and famine (Table 4.1). The colonial government spent GB £10 million on food relief, and US Aid food was also provided. This drought is still talked about in awe amongst the junior elders today, and is remembered as a time when things were worse than they are today.

These extreme droughts had significant impacts on the people of the South Rift and remain as vivid events. But the droughts of the 1920s, 30s, and 40s also led to significant long term land tenure changes, as they heavily informed the Swynnerton Plan (Swynnerton, 1955)[12], which (as discussed in Chapter 3.3 and suggested in Figure 4.1), began the process of land privatisation through land adjudication and registration.

In pastoral lands, the Swynnerton Plan precipitated the demarcation of the first ranches in Maasailand where individual land ownership was vested in male heads of households. These individual ranches were regarded as a successful intervention, because livestock of these ranches were not as badly affected during *Emboot Enkurma Sikitoi* (1959-1962) than others (although it is also true that these individualised ranches were on land with higher rainfall than ranches in more arid rangelands; Campbell, 1993).

[12]Along with other influences, including the perceived success of ranching schemes under ALDEV (African Land Development Board) which were incorporated into the Swynnerton Plan (Rutten, 1992).

Table 4.1 Table of significant drought events from 1883 to 2018, and the recorded impact that they had, particularly as they pertained to the South Rift.

Years	Event	Impact
1883	Severe drought and cattle disease outbreaks (Bovine Pleuropneumonia)	Worst famine in 30 years (Downing et al., 1989)
1890-93	Severe drought, cattle disease outbreak (Rinderpest), Smallpox outbreak	Approx. 90% livestock lost, thousands dying from Smallpox (Jacobs, 1965; Southgate and Hulme, 2000)
1897-00	Severe drought and cattle disease outbreak	Failure of consecutive rains with Rinderpest, locusts, continued Smallpox, railway construction added to food shortage. Impact all over East Africa but particularly bad in Kikuyu land, Kamba land and coastal areas (Downing et al., 1989)
1911-12	Migration of Maasai population from Laikipia to Southern Maasai Reserve	Large livestock losses (Southgate and Hulme, 2000)
1914-19	Drought and disease	Coincided with Sahelian droughts and impacts were exacerbated by warfare, restrictions on planting, livestock, also influenza and locusts (Downing et al., 1989)
1925-27	Severe drought Maasai call it *"Olameyu Loo Lonito"* (drought of the hides)	Famine and approx. 15% cattle lost (Sindiga, 1984) *Maasai boiled up hides of livestock and wild animals to eat and drink broth. Some sold hides as well* (I12, I13, I37)
1929	Severe drought	Approx. 50,000 cattle lost (Southgate and Hulme, 2000)
1933-35	Severe drought Maasai call it *"Olameyu Loo Loik"* (drought of the bones)	Famine, approx. 35% livestock lost. In Baringo county up to 50% loss (Downing et al., 1989; Southgate and Hulme, 2000) *"A bad drought which was worse than any other"* (I26) *Many wild animals died, "only the birds were left in this land"* (I37) *People in the South Rift hunted wild animals, and boiled up the hides and bones of livestock and wild animals to eat and drink broth* (I8, I12, I26, I37) *Bones of dead animals were also sold* (I12, I13, I16, I37) *Ivory was exchanged for cows and food* (I13)
1943-46	Severe drought Maasai call it *"Emboot Enkurma Nanyokie"* (season of the red flour)	Famine and Smallpox compounded by military demands on food (Downing et al., 1989) *People survived on a red flour (millet/sorghum) which they bought. No relief food provided* (I12) *All the cows died, and those who survived went to Oldonyio Gelai in Tanganyika. Relief food really helped* (I16) *Wild animals were eaten, or killed and sold, including ivory* (I8, I12) *The Batemi (Sonjo) provided the red flour that people ate* (I8) *The red flour was provided to people in the South Rift by the Germans* (I13)
1952-55	Droughts followed by floods	70-90% cattle mortality in places (UNEP and Government of Kenya, 2006)
1954-56	Drought in Amboseli and South Rift	Livestock losses in Amboseli (Grandin et al., 1989) Also affected the South Rift but impact not clear - *There was a bad drought around this period* (I26) *but it didn't kill many livestock* (I16)
1959-62	Severe and widespread drought	Famine and 50-70% livestock lost, up to 80% in some places. Widespread crop failure. Ten million Kenyan pounds spent on food relief in 1961 and US Aid received (Downing et al., 1989; Talbot, 1972; Willis, 1999)

Years	Event	Impact
	Maasai call it *"Emboot Enkurma Sikitoi"* (season of the yellow flour)	*Relief food was provided by planes dropping the food from the sky, and via trucks as well. Relief food included yellow maize, cooking fat, and ground meat. It was delivered by the British, but was from the Americans. Relief food lasted five years for some families* (I8, I12, I13, I14, I16, I26, I37) *People moved to live on the west side of the river and were stuck there when the Ewaso Nyiro River flooded and the bridge was covered. That is why food was delivered by plane* (I16, I37)
	Followed by flooding in South Rift	*The drought killed many cows, but there were not as many people as today* (I26)
1966-67	Eruption of Oldonyo Lengai It seems this period might be called *"Nado Entolit"*	Livestock losses in the South Rift *The wind blew the ash from the eruption north up to Mosiro and many livestock were very sick. No medicine would cure them, seemingly the chemicals from the eruption were harmful and resulted in the bone marrow rotting. Many animals in the area of the South Rift up to Mosiro died* (I13, I14, I26)
1973-76	Drought	Livestock losses of 35-40% in Amboseli (Finch and Western, 1977). By the end of 1976 there was famine in places with up to 80% of livestock lost (Bekure et al., 1991; Downing et al., 1989) *Long drought where up to 50% of cows were lost. Not so bad for sheep, goats or wild animals, maybe up to 15%. Numbers bounced back quickly after the drought* (I45) *"It was bad" - a severe drought but no relief food was provided so the only thing they could do was try to sell livestock* (I12, I17)
1983-84	Severe drought and East Coast Fever outbreak	Livestock losses of 50-70% and human migrations. Large food imports averted famine. (Downing et al., 1989; Homewood and Lewis, 1987; Oba, 2001) *The drought killed many livestock. There was no grass left in the lowlands, but grass remained in the highlands. People were given relief food from the government and NGOs* (I13, I17)
1991-92	Drought	*A drought occurred around this period* (I13)
1994-96	Drought	*"It was a severe drought" - there were food shortages and some relief food was provided by the Kenyan Government* (I2, I12, I17, I26) *Many people from the South Rift began to start cultivating* (I37)
1999-00	Drought	Cattle losses of 50% (UNEP and Government of Kenya, 2006) *Many people sold livestock at the market, but the livestock did not die in the same numbers as other significant droughts* (I12)
2005	Drought	Cattle losses of up to 45% and sheep losses of up to 47% (Nkedianye et al., 2011)
2008-09	Severe drought Suggested name of *"Olameyu Loo Matapato"* (drought of the Matapato)	Details of the impact in the South Rift in this study
2016-18	Severe drought followed by flooding Suggested name of *"Olameyu Lekeshomo Kamorora"* (drought when we went to Kamorora)	Details of the impact in the South Rift in this study

4.6 Post-independence changes in land tenure

In Chapter 3.4 I looked at the general historical context of GRs in Kenya. As discussed, following on from the Swynnerton Plan (Swynnerton, 1955), the Kenyan government commissioned Lawrence Report of 1966 (Lawrence, 1966) recommended group ownership of land in Kenya's rangelands. These GRs were legally established through the Land (Group Representatives) Act of 1968 (Government of Kenya, 1968). The first phase of adjudicating GRs under Kenya's Livestock Development Project began in 1970, but in the South Rift, the process of adjudicating and dividing the *Iloodokilani* olosho (section) of Maasai into several GRs only began in the mid-1970s as part of the second phase of Kenya's Livestock Development Project (Rutten, 1992). Two of these *Iloodokilani* GR were Olkiramatian Group Ranch (in January 1978; KI/1978/1[13]) and Shompole Group Ranch (in May 1979; KI/1979/1[14]).

In Chapter 3.4 I also describe how in many cases, the GRs have ultimately been subdivided into individual titles across large areas of Kenya's Southern Maasailand (Galaty, 1999; Herrera et al., 2014; Mwangi, 2007b; Rutten, 1992). However, in the South Rift, neither Olkiramatian nor Shompole have completely subdivided. Olkiramatian sought for, and was granted permission to subdivide, in 1993 (KI/1993/1), and then divided and sold off a portion of the GR, ostensibly to prevent *Ilpurko* Maasai who had settled[15] in the northern part of the GR and in Oldonyio Nyokie GR (I7), and with whom they had fought a short battle in 1972 (Galaty, 1978 in Rutten, 1992), from settling any closer[16]. No further subdivision has taken place, although there is always talk about this possibility (R48). These facts are important when interpreting social-ecological system change in the South Rift, particularly when Mwangi and Ostrom (2009) argue that the introduction of GRs, and their subsequent subdivision in other areas has resulted in rangeland social-ecological systems which are less robust.

[13]Land Certificate.

[14]Land Certificate.

[15]The *Ilpurko* Maasai settled here after they were moved by the colonial government from Laikipia in 1911-1912.

[16]The land which was sold was titled in the name of elites from that period, who benefited personally from the sale of the land (I7).

4.7 The Magadi Soda Company alter the social-ecological system

I have proposed that the South Rift was on the periphery of what was happening in terms of state driven conservation in Kenya during the colonial period. Nevertheless, there were significant social and ecological changes in the area as a consequence of powerful external actors, such as the Magadi Soda Company (MSC). Two changes are of particular importance within the context of social-ecological system change. In 1933 Major Pelling, the Manager of the MSC suggested that a significant saving would accrue by using the "unlimited supplies of wood available within economic reach of Magadi" (Hill, 1964:124) to fuel the MSC's factory[17]. So MSC began by felling "nearly all of the available timber in the Magadi Concession" (Hill, 1964:133) before building a bridge over the Ewaso Nyiro River[18] and felling trees beyond their concession, in the current conservation areas (I13).

From 1934 to 1949 (Figure 4.1), locally sourced wood, particularly *oltepesi* (*Acacia tortilis*), became the principal energy source for MSC, who used an estimated total of 190,799 tonnes of wood fuel over this period, at an average rate of 13,628,000 kg per year[19] (Hill, 1964). Large trees take decades to grow in rangelands, and under-story vegetation is key in rangeland grazing ecosystems (Hunter et al., *in review*), and the social and ecological repercussions of this are self-evident. Elders today believe that removing all these trees must have had an effect on the "*joto ya nchi*", the Kiswahili term for "the heat of the area." They also note that fewer people lived in these areas up to the 1950s, so who was going to complain about MSC's activities (I5, I13, I26)?

As MSC discontinued their felling operation, the supply of water in the springs of the Ngong Hills, from which they abstracted their water supplies, began to dwindle. Water is a crucial component in both the manufacturing process of soda ash, and for people living in Magadi. MSC could not take water from the nearby Ewaso Nyiro River which was too turbid, and too low to allow transport through gravity (Hill, 1964). Eventually, after rejecting a proposal to use the Enta Sopia River (see Figure 3.3), in September 1949, local representatives of the people living in the South Rift agreed that MSC could abstract water from the Oloibortoto (see Figure 3.3), in exchange for providing water at selected points along the pipeline east towards Magadi town. In

[17]The energy was needed in the process of calcining the trona from the lake.

[18]An area known today as Daraja, well outside of their concession area.

[19]A rough estimate, based on one to two tonnes of firewood per acre, suggests that the area cleared of wood was 95,000-190,000 acres (385-770 km^2) over 14 years.

1956, MSC were given a permit[20] for this water abstraction, and a small title deed for the land around the abstraction point[21]. During the first four months of the new water supply from the Oloibortoto in 1950, an average of 623,400 litres[22] was received in Magadi every day (Hill, 1964). Aside from use in the factory, thanks to the new supply of water, transported across the arid land of the South Rift, "gardens and trees soon made a marked improvement in the appearance of Magadi," followed not long after by a new swimming pool (Hill, 1964:156-157).

A recent flier circulated by MSC (now Tata Chemicals Magadi) claims that they currently receive 681,900 litres per day[23] (KI/U/1). Along the way 207,900 litres[24] a day are received between pipeline taps at various locations including: Kenya Wildlife Service station and ICIPE (International Centre for Insect Physiology and Ecology) offices, Olkiramatian town, Olkiramatian school, Tirangui, Pressure Tank, Birika, and Roserian. A further 1.8 million litres[25] is lost at the overflow station and mudflats (KI/U/1).

4.8 Provenance of Conservation Areas in the South Rift

This sets the scene for understanding how the conservation areas of the South Rift were created, in an area subject to droughts, which had remained on the periphery, and without any formal area-based protection (Figure 4.2). Here I will trace the recent history of conservation in the South Rift, based on archival documents and interviews with people from the South Rift.

4.8.1 Post-independence hunting in the South Rift

The post-independence Kenyan state continued the legacy of centralised parks and reserves (Kabiri, 2007), with landowners outside of these areas allowed to run hunting blocks on their lands. Under the 1975 Wildlife Policy and the 1976 Wildlife Act (Government of Kenya, 1975, 1976), landowners had full rights over the wild animals

[20]Permit no. 2348, issued in 1956.
[21]Based on a map copied from the Kajiado lands office.
[22]Equivalent to 137,143 gallons - note this not the amount abstracted.
[23]Equivalent to 150,000 gallons.
[24]Equivalent to 45,744 gallons.
[25]Equivalent to 408,000 gallons.

on their land, and fees for the hunted animals were distributed to them, through the County Councils.

Throughout the 1960s to 1970s, observers such as the Director of Agriculture for the Kenyan colonial government, Leslie Brown noted that in the South Rift there were "great numbers and variety of wild animals and birds" (Hill, 1964:189) with animals including the commonly sighted wildebeest (*Connochaetes taurinus*) and Burchell's zebra (*Equus quagga*), but also Cape buffalo (*Syncerus caffer*), impala (*Aepyceros melampus*), Grant's gazelle (*Nanger granti*), oryx (*Oryx beisa callotis*), giraffe (*Giraffa camelopardalis tippelskirchi*), black rhinoceros (*Diceros bicornis*), lion (*Panthera leo*), spotted hyaena (*Crocuta crocuta*), leopard (*Panthera pardus*), cheetah (*Acinonyx jubatus*) and rarely, elephants (*Loxodonta africana*). Jacobs also describes the area as "rich in wildlife, and elephants, buffaloes, and rhinos" (Jacobs, 1968:2) with leopards and other predators too. Maasai elders from Olkiramatian and Shompole also recall that when they were young, the area was abundant with wild animals, like black rhinoceros, "we would jump onto the roof of our house and shout 'look there's a rhino right here'" (I5).

Jacobs describes the areas to the west of the Ewaso Nyiro River (now the location of the conservation area) as "lost to Masai (*sic*) because of tsetse fly infested bush" (Jacobs, 1965:132), and Leslie Brown claimed "that the strip of land between the Uaso Nyiro (*sic*) and the Nguruman escarpment ... [was] protected from the ravages of domestic stock by the lack of fresh water or by tsetse fly, and [was] characterised by much more luxuriant grass" (Hill, 1964:189). Indeed, in the early 1960s there were very few *enkangs* on the west side (as shown in Figure 4.3), although elders stress that they used this area as a dry season grazing refuge during droughts, when they would build temporary *enkangs* in the area to access grazing (I5, I16, I37). This type of relationship between tsetse flies, wild animals, bush, and livestock was common across East Africa. Although areas with high tsetse numbers and trypanosomiasis were often avoided, or sometimes controlled with fire, in times of drought these same areas had decreased risk of trypanosomiasis due to the temporary decrease in vector populations, and so these areas were opened up as people were willing to gamble the possible death of livestock from disease against the certain death from drought (Kjekshus, 1977).

Throughout this period, several residents in the South Rift were unashamedly hunting wild animals such as Burchell's zebra (*Equus quagga*), wildebeest (*Connochaetes taurinus*), elephants (*Loxodonta africana*) and black rhinoceros (*Diceros bicornis*) for personal profit. Others continued to hunt wild animals for subsistence, the use of

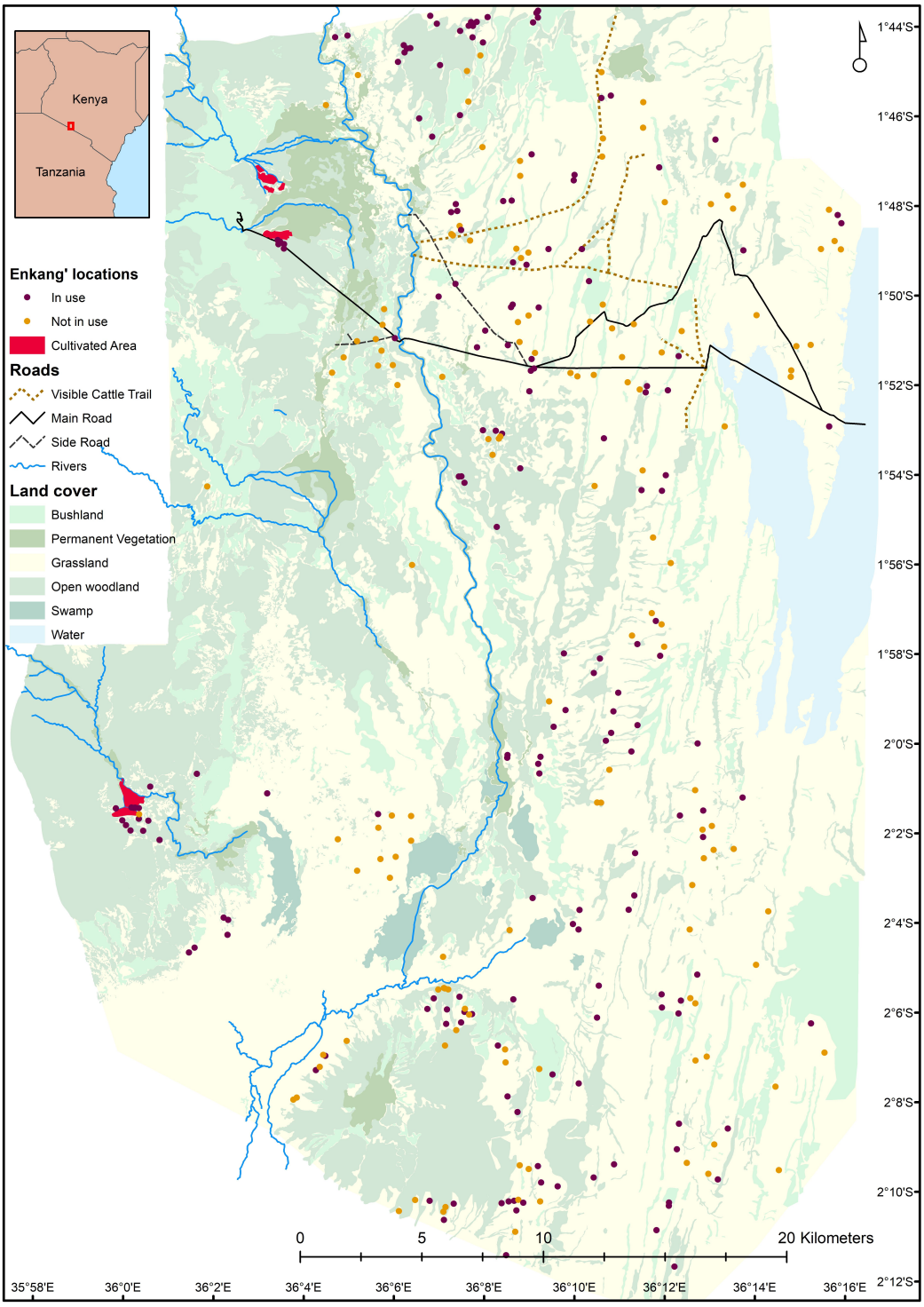


Figure 4.3 Land Cover, *enkang'* locations, and infrastructure of the South Rift reconstructed from 1961 aerial imagery. Note that *enkangs* are found all over, but even old and unused *enkangs* were not found in the area to the west of the Ewaso Nyiro River, where the conservation areas are located today, even though Maasai elders recall moving there in 1962 as the drought worsened (I16, I37). This was also the start of Emboot Enkurma Sikitoi and therefore, the differences between *enkangs* in use and not in use must therefore be interpreted with caution. There are also small areas of irrigated cultivation along the Enta Sopia, Oloibortoto and Pakaase rivers (see Figure 6.6).

culturally significant wild animal products, and as part of ritual hunts (I3, I6, I8, I11, I12, I13, I15, I17, I26, I39, R48). But so too were non-locals. By the 1970s (and perhaps earlier), the South Rift had people coming to camp, hunt wild animals and shoot birds. One interviewee recalls "I was in school and we would see these white people going to get a bush to camp in, and shoot birds with their dogs ... nobody would bother them" (I17, also I8, I13; KI/1975/1[26], KI/1976/1[27].

The GRs were beneficiaries of this hunting. In 1974 for instance the *Iloodokilani* GRs were paid KSh 104,504 minus 10% for compensation (KI/1976/1; I13). They used the money to contribute the community's share towards building a water pipeline from the Sampu River (See Figure 3.3) with the Maasai Rural Training Centre (MRTC)[28], and also to build the first cattle dip in the area (I8, I13). Leaders of the time saw Olkiramatian as pioneers in what could be achieved by having wild animals on their land "Olkiramatian was the first place to open up their eyes. The rest have just followed later" (I13).

In general, however, hunting in Kenya was marred by mismanagement, corruption, and unethical practices and was banned in 1977 (Government of Kenya, 1977; Figure 4.1) together with a ban on trade in wild animals and wild animal products in 1978 (Government of Kenya, 1978). Nevertheless, communities, particularly those of Narok and Kajiado (including the South Rift), felt they were benefiting from hunting (Kabiri, 2007) and the ban meant that their rights and associated benefits were lost.

4.8.2 Emergence of conservancies in Kenya

As mentioned above, until the 1970s, conservationists and range scientists viewed the Maasai and their herding practices as a "Tragedy of the Commons", destructive

[26]Letter from the Kenya Game Department to members of the South Rift to propose putting the area up as a hunting concession.

[27]Meeting minutes from 5th May 1976 sharing how much revenue the area earned from hunting, bird shooting.

[28]The Maasai Rural Training Centre (MRTC) was set up in the South Rift by the Anglican Church in 1971, on two parcels of land, one near Olkiramatian town, the other in Nguruman, which has gone on to become the Polytecnic College. In 1979 MRTC helped to construct a 75 km pipeline from the Sampu River, to join up to others and supply settlement areas in Olkiramatian, Oldurko Loitoi, Lenkobei, Lematakwa and Oloika. Construction took place from 1978 to 1984 with Dutch government funding and money from all four GRs (KI/1997/1). These were again fixed in 1997 by Piero Langiu when they were damaged in the 1997 El Nino rains (KI/1997/1). MRTC offered courses in building skills, animal husbandry, and farm was set up to breed improved livestock to sell to people. The area's first dispensary was built by MRTC. However, these declined over time, perhaps over a lack of funding, but also with some frustrations as livestock were stolen. Their buildings still exist.

to the rangelands and inimical to wildlife conservation and tourism (Grzimek and Grzimek, 1960; Hardin, 1968; Huxley, 1961). These views were part of the justification for creating national parks and reserves in pastoralist areas that excluded Maasai from grazing lands in both Tanzania and Kenya in places like Serengeti, Mara, Tarangire, Amboseli (Homewood and Rodgers, 1991; Neumann, 1998). This view began to change in the 1970s when ecological and social studies showed that traditional husbandry practices and governance of the grassland, coupled with Maasai cultural aversions to eating the meat of wild animals except in extreme times, helped to explain the long-term co-existence of people and wildlife in much of Eastern Africa's savannahs (Sandford, 1983; Western, 1982; Western et al., 2020). These changes with respect to the Maasai reflect the wider paradigm shift discussed in Chapter 1.2 and 3.5.

In the 1970s the first non-state protected areas, now referred to as conservancies, began to appear in Kenya, on private and community land. Kenya's Wildlife Conservation and Management Act of 1976 (Government of Kenya, 1976) formed a new Wildlife Conservation and Management Department, and Sessional paper No. 3 formally recognised community conservation as a wildlife management strategy (King et al., 2015). The first visible form of a community conservancy run by the GR committee, in Kajiado, was the Kimana Community Wildlife Sanctuary, which set the blueprint for many conservancies since (Rutten, 2004).

The number of community conservancies in Kajiado continued to grow slowly in the 1980s (King et al., 2015). By the 1990s conservancies were being supported by the Kenya Wildlife Service (KWS) through their "Parks beyond Parks" policy. This policy was an attempt to recognise that Kenya's protected areas could not protect wildlife on land owned by people living outside protected areas, and particularly in the wildlife rich rangelands which were managed by pastoral people (Rutten, 2002; Western et al., 2009, 2015b). This paved the way for conservation areas in the South Rift.

4.8.3 Conservation areas in the South Rift

Projects, conservation, and eco-tourism in the South Rift

In the late 1960s and early 1970s Philip Leakey[29], working with the late administrative chief Jeremiah Lesale, grew irrigated crops in an area now referred to as Kisidai,

[29]Before he became the first white Kenyan member of parliament, representing the Langata constituency from 1979 to 1992.

near Pakaase (I13, I17). He discussed the possibility of setting up a tourist lodge with the leaders of Shompole in the late 1970s[30] , but in the end he "jumped over" them and worked with people from Narok[31] to set up a lodge on top of the escarpment (I13, I17). The people of Shompole wanted Philip removed after they were prevented from accessing grazing areas on top of the escarpment during a drought. They approached the District Commissioner to ask for his removal, but were refused. So local leaders of the time[32] went to their *oloiboni*[33], and asked for spiritual help. Local informants believed that their request worked, as they retell how termites destroyed the two lodgings that Philip had built (I13, I17), so, as they see it, Philip packed up and left[34].

Through the period up to the 1980s the area to the west of the Ewaso Nyiro River informally remained as a late dry season and drought grazing refuge, and the escarpment to the west of this again, was used as a last resort (I2). There were semi-permanent *enkangs* close to the river in places like Daraja and Ladama, but not further west (this was the case in 1961 as shown in Figure 4.3), which was "protected as a place with many trees, and various herbs, and so that they could hold *ilpuli*[35], but during severe droughts, people would move in" (I2).

Then in 1989 (Figure 4.1), Olkiramatian decided to formalise this zonation by dividing their land into three zones: year-round livestock, cultivation, and late dry season grazing for livestock (I13; ACC/2005/2). At the "The Second Conference on the Future of Maasai Pastoralists in Kajiado District" in 1991, where prominent Maasai debated the future of Maasai, the "Olkiramatian concept" - where the ranch is zoned into various economic units (as above) - was put forward as a potential future alternative for GRs, instead of subdivision (Rutten, 1992:459). The "Olkiramatian concept" was described again by a group of entomologists and ecologists in the 1990s (Roderick, 1995; Williams et al., 1995), with the west side of the Ewaso Nyiro River still a dry season grazing refuge, where the vegetation was denser, and where there were more tsetse flies (Roderick, 1995). If the drought persisted, people would move

[30]1976 or 1977.

[31]Together with Moses Lowuaya.

[32]Reported to have been led by Pariken and Siamito.

[33]Prophet, ritual expert, medicine man, spiritual leader.

[34]Some years later, Hermann Steyn arrived in the area, after leaving Tanzania where he was a shareholder and director of Rift Valley Seed Ltd. before the nationalisation movement of Julius Nyerere forced him out. With the help of Moses Luluwaya Lontasat from Elangata Wuas (I13, I17, R48), Steyn helped to dissolve and transfer the assets of the Kamorora GR into Steyn's company, Nguruman Ltd. Over time, Steyn bought out other shareholders in the company and became the principal shareholder (see Galaty (2011) for more details on the contested origins of Kamorora GR).

[35]Meat camps where they would also drink medicinal soups.

up the Nguruman escarpment, and into neighbouring GRs, or into Tanzania.

ICIPE in the South Rift

In 1987 the International Centre for Insect Physiology and Ecology (ICIPE) started a tsetse and trypanosomiasis research programme at Nguruman, in Olkiramatian (KI/1991/2). At that time the western side of the Ewaso Nyiro and the Nguruman escarpment, held high densities of tsetse (Williams et al., 1995). Two British scientists working at ICIPE, Dr. Robert Dransfield and Dr. Robert Brightwell (hereafter referred to as "the Bobs" - the endearing collective term that people in the South Rift still use) developed a trap to control tsetse flies that could be constructed and maintained by residents of the area. The trap, known as the NGU or NG2G trap (Lako, 1998), was constructed with locally available materials, and local people from the South Rift were involved in many aspects of the design and implementation of the trap (Williams et al., 1995). The traps were a success, and the Bobs now wanted to get residents to carry out their own tsetse control.

In 1990, the Olkiramatian GR Management Committee and members decided to extend tsetse control beyond the ICIPE research areas to cover the entire GR (Williams et al., 1995; KI/1990/1, KI/1991/2) and people across the GR[36] were trained in how to build and maintain the traps. The Bobs and the GR committee stated that they wanted to "combine tsetse control with other development projects" (KI/1990/1) including an eco-tourism project which charged tourists who came to camp[37] or view the abundant wild animals (I3, I17) and a small enterprise run by women. The Bobs were going to leave their positions at ICIPE to run the project, but it still needed institutional support, yet when they turned to ICIPE for help, it was made clear to them that ICIPE was a research organisation and could not support development activities (KI/1991/2). Several meetings were held where "it was a challenge because people did not want an area for wild animals" but the leadership of Olkiramatian were eventually able to get people to agree (I3). So, once they invited in their neighbouring GR, they formed the Olkiramatian and Shompole Community Development Project (OSCDP) in 1991 (ACC/1994/2, ACC/2002/1).

[36]Including my research assistant's family.

[37]Some of those who came to camp around this period have now become the operators of the lodges (I31).

Growing OSCDP

The Bobs had connections with overseas donor agencies, so they found some funding for the project, hired a few employees[38], trained them as researchers and guides, set up entrance gates to the west side of the Ewaso Nyiro River[39] (now the conservation area) and charged visitors to enter (I1, I2, I17). With the help of KWS, a functioning community eco-tourism programme was established (Williams et al., 1995). Two members of each GR were given intensive training in wildlife tourism, and they set up campsites[40], near water, with signposts, fireplaces and rubbish tips. The eco-tourism opportunities of the area were advertised in Nairobi with booklets and maps. OSCDP arranged for the Kenya Ministry for Social Services to provide adult literacy classes for some of the women who had a campsite, and formed a group to sell beadwork, both locally to visitors, and in Nairobi. Revenue from eco-tourism helped to pay the salaries of some employees who would maintain the tsetse traps which were the core of the project. In Nguruman, tsetse densities were reduced by 97%, and other the populations of tsetse in other areas also declined. As the fly numbers declined, so too did the threat of trypanosomiasis, and people were able to take advantage of new grazing (spatially and temporally). So all in all, "OSCDP was functioning well" by early 1993 (Williams et al., 1995:32).

ICIPE vs OSCDP

However, ICIPE's trypanosomiasis research programme relied on the presence of tsetse flies, and so as OSCDP succeeded in decreasing tsetse fly numbers, ICIPE grew frustrated at the achievements of OSCDP's projects (R49; Williams et al., 1995). ICIPE also believed that relying on local people to maintain tsetse traps was premature. A long series of disputes began between Olkiramatian and ICIPE (KI/1991/2, KI/1991/3, KI/1992/1). The dispute resulted in the Chairman of Olkiramatian GR[41], asking ICIPE to leave the GR, as ICIPE were simply researching and re-releasing tsetse

[38]The first employees of the project continue to be influential members in conservation and development in the community. Among them were John Kamanga (now the Director of the South Rift Association of Land Owners - SORALO), Albert Kuseyo (SORALO's Community Liason), Joel Kanunga (now operates a Solar Kiosk in Enta Sopia), Michael Kapoli (now occasionally works as a local researcher for BirdLife, ICIPE, and others), and Ibrahim Adan.

[39]They set up their base in the area that has today become the Lale'enok Resource Centre.

[40]The campsites were deliberately set up in the places that the hunters of the past used to use, where wild animals were present year round (I2).

[41]At that time it was Tanin Ole Kinana.

flies, whereas OSCDP were killing the tsetse flies. Olkiramatian GR's Management Committee said they would remove all ICIPE traps, but ICIPE retorted that they would remove OSCDP traps. Both sides began removing traps, and a final meeting between the sides was called. Many Olkiramatian GR[42] members, the Bobs, and ICIPE leaders, attended this meeting. GR members were shocked when the Olkiramatian GR Chairman, who had signed many of the letters asking ICIPE to take down their tsetse traps (KI/1991/2, KI/1991/3, KI/1992/1) made a complete turnaround and declared that the Olkiramatian GR Management Committee did not see the benefit of the OSCDP projects, neither the women's beadwork projects, the eco-tourism, nor the control of tsetse flies (I13, R49)[43].

This sudden change of mind by the Olkiramatian GR Chairman resulted in heated exchanges. People resorted to threatening to break social ties to each other by "taking back their daughters" (R49). People on both sides also began to invoke their cattle, the traditional way to sway opinion. Yiamet Mpesi, Olkiramatian GR's treasurer at the time, declared that people should listen to him and support the removal of OSCDP, "I have said [what I have said], and I have a small open castrated, striped, brown and black steer"[44], a special cow colour that could remind those present of the beauty of his cows (R49). Assistant chief Melita Kisioki refuted that they should listen to him and support OSCDP because "never mind that small brown and black one of yours, I have a greyish steer, mine is closed castrated, striped brown and black, and big, and fat"[45] (R49). Eventually Robert Dransfield told the community that the time for research was over, and they would not stay on if ICIPE continued (R49). ICIPE stayed, and OSCDP came to a halt in June 1993 (ACC/2002/1) when the Bobs withdrew with their funding[46].

[42]Including my research assistant.

[43]One interviewee who was in a leadership position at that time claimed that "the Chairman was given [bribed] KSh 60,000 and his committee were also given money" by the heads of ICIPE who lamented that they were only getting big international grants because of the trypanosomiasis research that they were doing and that "all their funds were coming from Nguruman" - they had a grant for US $7 million to work on tsetse ecology. The source asked for this statement to be kept anonymous.

[44]*"Atejo, oloata orkiteng' sampu ogelema naa mulee."*

[45]*"Aata olarus, aisampu, olalai neidong'o nepirr, tapala iyie ina kiteng' ino sampu mulee."*

[46]Their staff also resigned including John Kamanga who went on to work for the NGO SNV Netherlands Development Organisation before taking on the chairmanship of the GR and later becoming the Director of SORALO.

Shompole set up a conservation area

After the collapse of OSCDP, Olkiramatian and Shompole ended up with a vehicle and motorbikes left over from the project (ACC/2002/1). A member of Shompole GR who had worked for OSCDP got some support from the Bobs to spend a three month internship with the Ilkerin Loita Integral Development Programme[47] in the Loita Forest highlands, to the west of Shompole. Inspired by their programme, upon returning to Shompole, he set up the Shompole Community Integral Development Project (SCIDP) in 1994 (I17; ACC/2005/4), a community project, which was approved by the GR at an annual general meeting on the 8th of May 1994 (ACC/1994/2). Through SCIDP, Shompole GR decided to set up their own eco-tourism and wildlife project, offering campsites, maps, tour guides and food to visitors who paid entry and camping fees (Figure 4.4). SCIDP set out that "as a community, we wish to move forward with the rest of Kenya, whilst retaining the best aspects of our culture and lifestyle, together with the natural environment which has been home to our people for generations" (Figure 4.4).

In June 1994, the SCIDP manager sent a letter to Dr. David Western[48], who was about to become Director of Kenya Wildlife Service, to ask for support (ACC/1994/3) to pay an eco-tourism lodge operator, Calvin Cottar, to help the SCIDP committee to write a project proposal (ACC/1994/2) to conduct a more thorough assessment of the conservation and eco-tourism opportunities in Shompole. Between 1995 and 1996 a team collected these data and found that at that time they averaged 24 visitors per month, 40% of whom were campers, that the community were interested in potential eco-tourism revenue, and that the area had numerous species of wild animals (ACC/2002/1). The study concluded that "there is a lot of potential here" (I1; ACC/2002/1).

At the same time, the African Conservation Centre (ACC)[49], with the help of Dr. Western, had a larger vision of creating a conservation network in the South Rift,

[47] A well regarded and long running project set up by the Catholic Church in the Loitas.

[48] Dr. Western was about to leave his position as Director of Wildlife Conservation International which at the time a division of the New York Zoological Society, now the Wildlife Conservation Society.

[49] ACC are a Nairobi-based non-governmental organisation, formally registered in 1995. They describe their mission to "conserve biodiversity in East Africa and beyond through the collaborative application of scientific and indigenous knowledge, improved livelihoods and good governance through development of local institutions" (ACC, 2020). ACC started as the Nairobi-based East African headquarters of Wildlife Conservation International, today known as Wildlife Conservation Society, International.

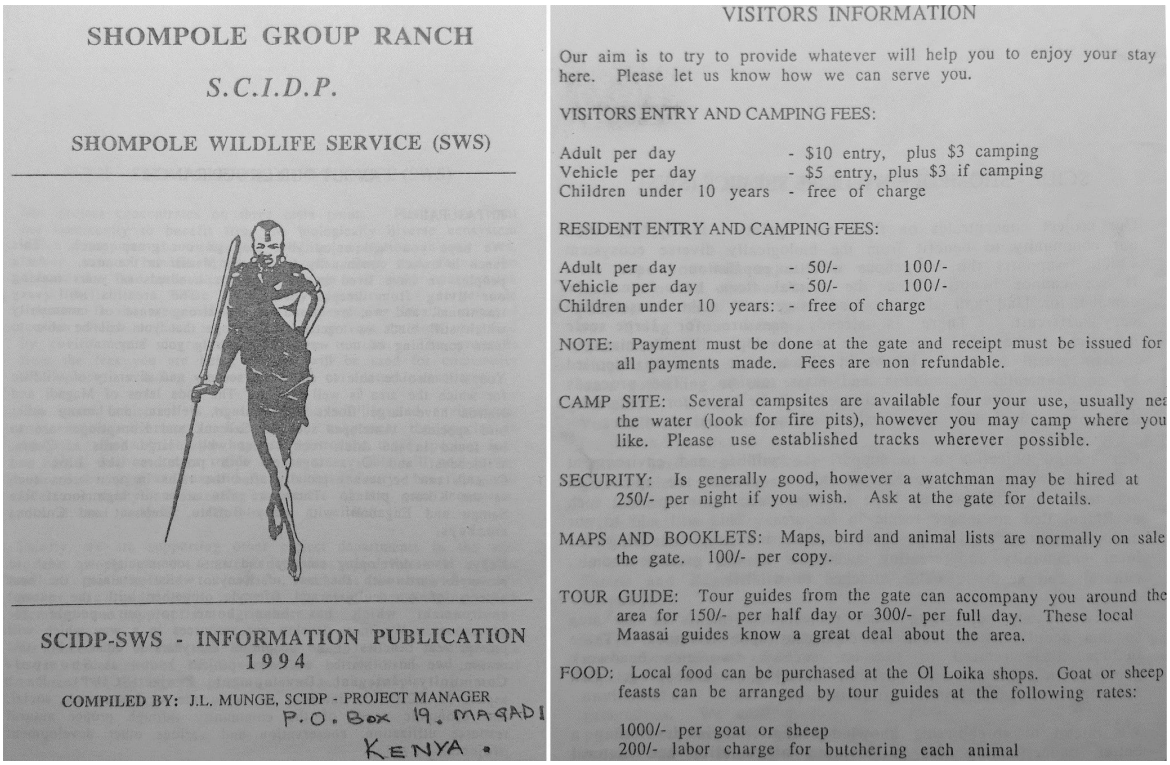


Figure 4.4 Information leaflet created by the Shompole Community Integral Development Project in 1994, including prices for visitors. Pictures by Peadar Brehony.

the Lake Magadi Conservation Area (ACC/1997/1; I2) to operate under the Magadi Conservation Trust which they helped to set up (ACC/1998/1). This network included representatives of Shompole GR, Olkiramatian GR, Oldoinyo Nyokie GR, Olkeri GR, Magadi Soda Company's Titus Naikuni, and potential eco-tourism lodge operators. Out of this project, a select group of people from these GRs were trained as community scouts, and local leaders were supported on a visit to the Kimana Community Wildlife Sanctuary in Amboseli, which was seen as the potential model to follow for community based conservation in Kenya. However, the Trust ultimately fell apart with issues about paying lawyers' fees, the challenge of several GRs working together, and general slow progress blamed on the drought (ACC/2001/3). Nevertheless, ideas about the potential of community-based conservation and eco-tourism were now regularly being discussed[50].

Shompole in particular was interested in growing SCIDP (I17), and they were willing to work with ACC to attract potential eco-tourism lodge operators. Evaluators

[50]From interviews it seems that two individuals from Shompole were key in keeping this process going, Yusuf Patenya and Joseph Munge.

of ACC's Community Conservation Programme at the time noted that there was "a philosophical position amongst the [ACC] staff that they should not be driving the agenda for communities. Instead they [ACC staff] feel that initiatives should come from the communities and they should be providing technical support". The evaluators note that although this "shows admirable restraint, and no doubt accounts for the feeling among communities that ACC unlike some other conservation NGOs, is not 'taking over', it results in projects stalling" (ACC/2001/3:46; I43).

This approach meant that the Shompole GR Management Committee were willing to listen when ACC suggested that Anthony Russell, a tourism investor who had previously set up Galdessa lodge in Tsavo East National Park, might be interested in setting up an eco-tourism lodge in the area. To convince community leaders of the merits of eco-tourism lodges, ACC supported Shompole GR members (mostly men, but some women) to travel to other eco-tourism lodges in Kenya including Olderkesi, Lewa Downs, Il Polei and Il Ngwesi (ACC/2001/3). The leaders were impressed with what they saw. So, through a series of meetings which included the GR committee, administrative chiefs, and *ilaiguenak* (spokesmen of each age-set) (I16, I22, I26, I27, I28, I39), they agreed to have a conservation area with a lodge: "the agreement was that we had to look after this place ... to all agree to look after the conservation" (I26) (Figure 4.5a). The *olaiguenani* (spokesman) of the age-set in leadership had to give his blessing: "this camp ... a long time ago, I told them let's hold it because it's something good, it will bring well-wishers whom will come to uplift many people" (I28).

Shompole then negotiated with ACC and Anthony Russell's company, Art of Ventures (AoV) about a partnership, and where a lodge might go. In terms of location, they agreed that the lodge should be on the west side of the escarpment where most of the wild animals were, on the lower reaches of the rift escarpment, at a spring used by Ndorobo[51] in the past (I17, I43). It was also emphasised from the start that cattle had to use this area, when there was "*olameyu* [drought] ... when all the other places are finished" (I26).

Shompole Lodge opened in 2001, and the partnership between Shompole GR and AoV led to the formation of Maa O Leng Limited (MOL), a jointly owned company, which would run Shompole Lodge (ACC/2001/1[52]). The articles of association set out that Shompole GR would begin with a 30% share in MOL and that AoV would have 70%, but Shompole GR were entitled to purchase up to 80% of the total shareholding

[51] Hunter-gatherers who speak Maa.
[52] Articles of association.

of MOL within nine years of the agreement, and the remaining 20% at the end of a 15-year period (ACC/2002/2). Shares were to be transferred through dividends based on profits made by the lodge[53].

Shompole agreed to lease out an area of 500 acres (2 km^2) as the lodge site for the exclusive use of MOL, for 15 years. Shompole would also "set aside a further approximately 10,000 hectares [100 km^2] of land surrounding the lodge site for use as a conservation area for the exclusive use of MOL" (ACC/2002/2:5). The agreement stated that AoV would "only act as advisors ... in relation to conservation affairs" (ACC/2002/2:6). The agreement also stated that Shompole agreed to do the following in the conservation area: "limit grazing and building of manyattas", "prohibition on infrastructure development e.g. schools, roads, etc.", "prohibition on development of agriculture" (ACC/2002/2:6) but crucially, the agreement also included a clause where MOL directors, in conjunction with the Shompole GR Management Committee "shall determine the conditions that constitute drought or other natural calamity" and therefore decide whether to "permit Shompole GR members from accessing and utilising the conservation area for grazing or building temporary manyattas (*sic*; referring to settlements)[54]" (ACC/2002/2:7).

ACC were aware of other kleptocracies among GR committees across Kajiado, so to ensure the sustainability of Shompole's conservation efforts, ACC helped the GR to set up the Shompole Community Trust, in 2002 (I45). This included 16 trustees, including Dr. Western, with others drawn from Shompole GR members from across the GR geographically (ACC/2002/3). The Trust would control the community's revenue from eco-tourism and funded conservation projects and use these to fund conservation and social development projects of their choosing. The Trust was to be "separate from the Group Ranch, ... managed professionally ... trying to bring in non-political leaders" (I45).

In 2001, to kick start the process, ACC helped Shompole GR and AoV to obtain funding from the EU's Biodiversity Conservation Programme for KSh 12 million, which was to be managed by Shompole Community Trust (ACC/2005/4). The funding would support capacity building amongst local leaders, pay for an entirely community owned eco-tourism development[55], purchase vehicles, hire 20 game scouts, a conservation man-

[53]This was where there was a crucial misunderstanding.

[54]More specifically: "in times of severe drought ... grazing may be allowed in the core conservation zone ... in normal drought spells, grazing may be permitted in the conservation buffer zone. Normal grazing may take place unrestricted in the wildlife dispersal zone" (ACC/2002/2:7).

[55]This became Shompole Bandas, six self-catering rooms with a kitchen and dining hall.

ager, construct gates into the conservation area, purchase communication equipment, and help to build infrastructure in the area. From 2001 to 2005, tourist fees from Shompole Lodge resulted in KSh 4.5 million[56] being paid into the Trust (ACC/2005/4).

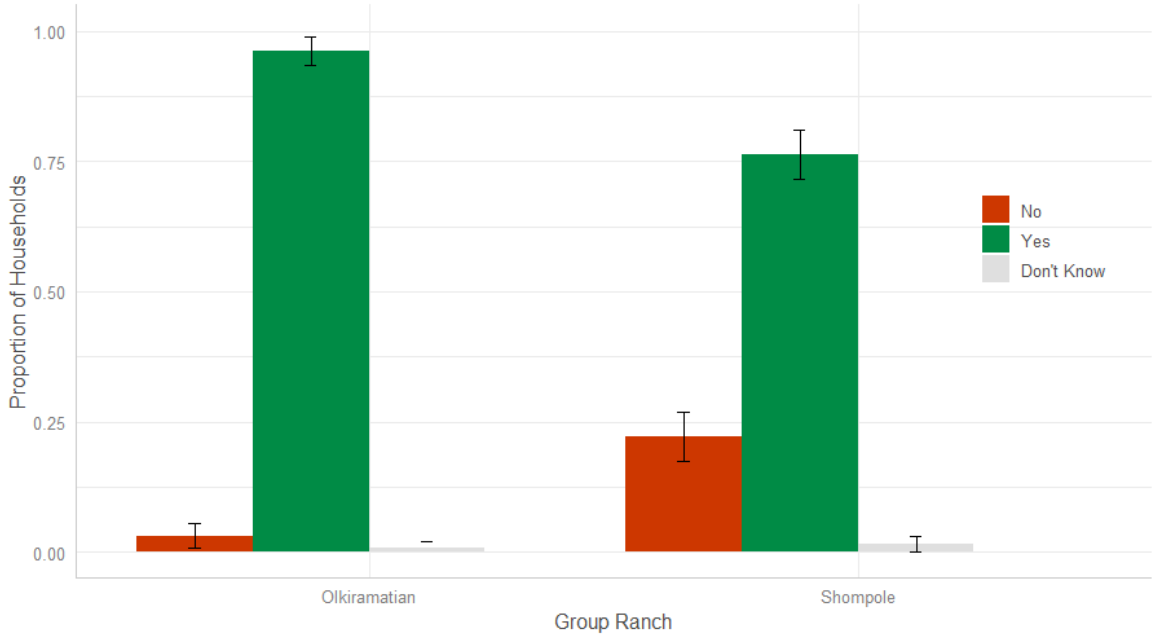
Olkiramatian want in

By 2002, Olkiramatian's GR Chairman (KI/2002/1) saw that in Olkiramatian, local elites had started to control tourist campsites individually, and were looking to sign personal agreements with outside eco-tourism investors for the use of the campsites (I1, I2, I7). Only a few rich elite households would benefit from such arrangements: "it was going to be a land capture from a few and deny an opportunity for the rest" (I1). The Olkiramatian GR Chairman therefore convinced several other leaders that this was not the direction to go, and that instead, they should amalgamate and form a conservation area that would benefit all (I1, I2, I7, I11). This kind of decision could only be passed at a GR general meeting, and this was not easy: "you were taking away investment and property from leaders who are already in power ... to give it back to the masses. But of course there was the backing of the masses and they voted for the creation of a conservancy that brought all of us together" (I1; Figure 4.5a).

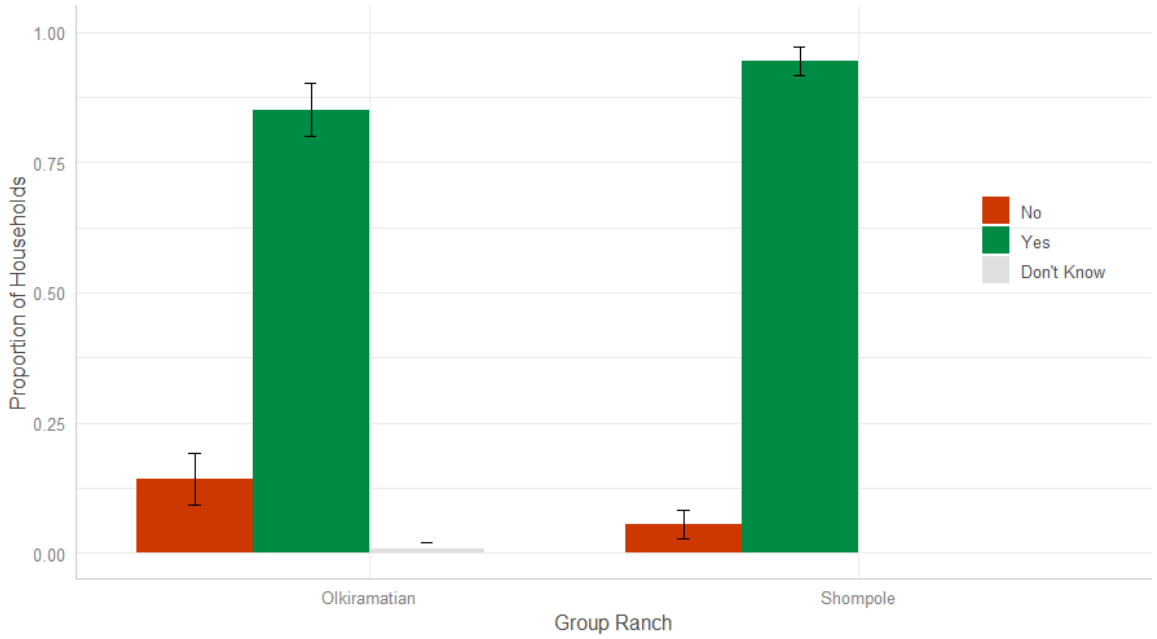
The area to the west of the Ewaso Nyiro River was chosen as the conservation area, based on the zonation they had agreed upon in 1989, the sites of existing campsites, and the presence of wild animals year-round (I1, I2, I14). As in Shompole, the leadership were very clear, "the conservation area was never created just as a conservation area ... it was created as a dry season grass bank and that is how we have always treated it" (I1), and "during the drought we come over here [conservation area], if they [lodge operators] have visitors they tell us, we push livestock to the lower side; but it is a place we reserved for grass" (I11). Olkiramatian decided to register their conservation area, the "Olkiramatian Wildlife Conservation Group" as a Self-Help Project in the Department of Social Services, under the Ministry of Gender, Sports, Culture and Social Services, in 2003. The Olkiramatian GR Management Committee recognised that the conservation area would be key in attracting eco-tourism investment, so they "branded it as a conservation area for purposes of bringing in *additional* [my emphasis] income from tourism" (I1).

By 2003, Olkiramatian GR Management Committee had approached ACC (I1, I43, I45) to help them secure funds from the EU's Community Development Trust Fund

[56]Approximately US $61,500 at 2005 exchange rate.



(a) "At the time that the conservation area was set up, did you agree with that decision?"



(b) "Do you agree with the decision to have a conservation area at the moment?"

Figure 4.5 Household survey responses when asked if they agreed with the decision to set up the conservation areas, and if they still agree with that decision today. Error bars denote 95% confidence intervals.

(CDTF), to set up an eco-tourism camp, with an investor, Biketreks (ACC/2003/1, ACC/2003/2). However, some members of the community "feared a lot" (I2) when KWS became involved; they were uneasy about who the land in the conservation area would belong to, and wondered if this was a way for the government to take this land for conservation.

To assuage their worries, members of the GR were taken to Il Ngwesi, an eco-tourism project in Laikipia, with funding from ACC (ACC/2005/2), to understand how other communities ran and took ownership of their conservation areas. In December 2003, Olkiramatian's conservation and eco-tourism project was, ironically, launched at ICIPE's offices in Olkiramatian, the same organisation that had prevented the continuation of their previous attempt at a similar project. In order to show their willingness to participate in this joint venture, members of Olkiramatian GR were asked to donate a male goat towards the initial investment in this project (R48, R49). Several promises were made that day, particularly with regards to how the revenue of the eco-tourism project would be shared with the community, particularly through school bursaries and support for emergency hospital treatments. The resultant "Sampu Tented Camp" was opened in December 2005 (ACC/2005/6). But just as things were starting up, the eco-tourism camp was burnt down.

Things fall apart in Olkiramatian: burning of Sampu Tented Camp

To oversee the activities of the conservation area and the funding from the EU's CDTF, Olkiramatian set up an implementation committee composed of GR members. However, the Chairperson of this committee and the Chairperson of the GR differed[57] when it came to control over the conservation area, and particularly the community's income from the eco-tourism project, and the use of the funds from the CDTF (I17, I34, I43, R48).

Things came to a head on the 8th December 2005, the night after a crucial meeting about the use of the funds from the CDTF when the implementation committee had been implicated in the misused of funds. A delegate from the EU, Dr. Western, and several ACC staff were staying at the tented camp, when, late at night, cars parked at the camp were set on fire, burning down parts of the camp. People were evacuated, and the police and KWS were quickly called. The main suspect in the investigation

[57]As one member put it "when two buffaloes, or rather elephants, fight, it is the community who suffers, it is the grass".

was the Chairperson of the implementation committee[58] who was arrested. However, there were no witnesses and the case never culminated in any prosecutions[59].

Olkiramatian were unhappy with having been put into disrepute and decided to carry out their own investigation. A general meeting of the GR[60] was called. Many members turned up and discussed the events, and who might be responsible, at length (R49). Aside from the Chairperson of the conservation committee who was being held in jail, they shortlisted others and decided that the only way to find out who did this was to "break the back of the community" with a curse ("*adung' emurua enkoriong*"). The fathers of the shortlisted accused, and other powerful elders performed a curse once the meeting was adjourned.

The drastic nature of two incidents that occurred some months after this curse have led some members of the community to believe that it worked (R48, R49). Two people who were considered possible suspects were due to meet each other in Magadi. On their way, one was attacked by a Cape buffalo in an area where Cape buffalo are rarely seen, and suffered a broken leg. The other person died when the pickup he was travelling in rolled, killing one other person and injuring several others.

Things fall apart in Shompole: burning of Shompole Lodge

As the revenue generated by Shompole Lodge grew over the years from 2001 to 2007, so too did disputes between the lodge operator and the GR (ACC/2003/5; I17, I30). The underlying issues had been simmering since the Shompole Lodge opened in 2001 (ACC/2003/5; I17, I22, I30, I43). Issues included the hand-over of shares from the lodge operator to the community, based on profits from the lodge, which was tied to reaching a break-even point[61].

In response to questions from ACC about the agreement in 2003, the lodge operator claimed that AoV, through their time, assets, and money, had invested "in the region of US $1.7 million" and that the costs of running and managing Maa O Leng (MOL; AoV and Shompole Lodge), was on average US "$40,000 per month". The lodge operator claimed that bookings were only meeting 50% of this, so MOL was in fact losing

[58] He owned one of the only cars in the community and the car tyre prints allegedly matched those of his car.

[59] Some GR members contend that individuals were paid to burn the cars, some of whom have allegedly since "disappeared" (unnamed members).

[60] On the 25th of June 2005 (R48, R49).

[61] When the lodge would be making as much as it was spending.

money. Therefore, the lodge operator claimed, Shompole GR should in fact be paying him, as they owned 30% of the losses that were being made (ACC/2003/3; I17, I30). Other contentious issues included: the amount of money the community were getting from conservancy fees[62]; the lack of employment for community members[63]; the unfair distribution of profits from curios and bead work; and the lack of transparency in lodge finances. On the other hand, the lodge operator was frustrated about the repayment of a loan he offered the GR in 2000, and about how money from the conservation fees was being used: "conservation is not on the agenda, which is the very principle of why we invested at all in the area" (ACC/2003/3).

These issues with the leadership of the GR kept resurfacing. In the build-up to the 2007 elections in Kenya, the Magadi Ward MCA (Member of the County Assembly, Kajiado County) candidate sought the support and financial backing of the lodge operator, and reassured him that if he won the election, he could have the GR Management Committee removed, install a supportive leadership, and leave these issues aside. The lodge operator decided to support the MCA candidate, who won. The GR leadership now felt threatened and thought that the only way to protect their positions was to remove the lodge operator. The lodge operator was caught, as although the MCA had claimed to be able to help to install a new, more supportive GR Management Committee, legally, only the GR have the mandate to negotiate investments within the GR (Government of Kenya, 1968; I17, I30, I45). The MCA sought support from the area's Member of Parliament (National Parliament), the late Professor George Saitoti, who was Minister for Interior Affairs at that time[64], to defuse the situation. He suggested that Philip Leakey[65] mediate the conflict, with support from AWF (African Wildlife Foundation)[66] (I17, I30). A new agreement was proposed, but the community "disagreed at the 11th hour" (I17), and the mediation failed. The lodge operator went back to Prof. Saitoti and convinced him to provide a convoy of

[62]Some accused the lodge operator of keeping some of this money. The community expected to get 100% of the money, but only received US $40 from the US $85 charged (17).

[63]Supposed to be 70% from the local community and 30% outsiders whereas it was 56% outsiders and 44% community (ACC/2002/2).

[64]He was also a former vice-president and a key figure in Kenyan politics. He died in suspicious circumstances in a helicopter crash in 2012.

[65]A former Member of Parliament with a complicated, but long standing relationship with the people of Shompole.

[66]AWF's Vice-President of Programmes at the time was Helen Gichohi, who was previously Director of ACC.

General Service Unit Police vehicles to remove all of his property[67] from the lodge, in September 2011 (I17, I30).

What followed were a series of court hearings, as the lodge operator fought attempts by the community to revoke the agreement and to dissolve MOL, so that they could form a partnership with a new lodge operator. Eventually the community succeeded and quickly signed a new agreement with a new lodge operator in 2014, who promptly began renovations. With the backing of the MCA, and armed with a court letter, community members who supported the former lodge operator, and wanted to prevent the take-over by the new operator, approached the lodge. They were stopped, and warned not to approach the lodge, by a young guard armed with poisoned arrows. They did approach, and a man died after being shot by a poison arrow. The next day, supporters of the previous lodge operator returned, and burnt the lodge down. Although others were present, no one attempted to prevent them[68]. These events shocked the people of Shompole, who felt the real effects of "these stupid politics", and claimed that in the end, they "have all lost" (I17).

4.9 Conservation and eco-tourism continues

As one interviewee (I3) put it, "there is no home without problems," and sometimes things get tough, but these challenges can be overcome, and lessons can be learned. Throughout this period, and after the collapse of each of the lodges, generally, rules about temporary settlement in the conservation areas in dry seasons and droughts, were maintained[69]. Seasonal access to grazing was permitted. Research and monitoring of wild animals over this period suggested that wild animal populations were relatively stable (Schuette et al., 2016).

This was not the end of eco-tourism for either GR. In 2011, Olkiramatian signed a lease agreement with an eco-tourism lodge operator. In 2017, Shompole did the same[70]. They also signed another lease agreement with Six Senses Hotels in 2019, for the land where Shompole Lodge once stood. The *ilaiguenak* from Shompole reported that they were once more consulted in the process of negotiating this most recent agreement (I18, I28). However, the leaders involved in the process were convinced that things

[67]His company owned all moveable assets.

[68]The police later arrested four people for arson, and the case is ongoing.

[69]I will go into much greater detail about this process in Chapter 5.7

[70]This was for the land where the aforementioned community owned Shompole Bandas were, mentioned in footnote 55

would have to be clear from the outset: "there will be no [tourism] investor who will have the power to say that this is theirs. No. They will be able to go anywhere, but they won't be given control. They can't own it, it is ours ... but we will reach an agreement ... but if they disagree, we will say this is our land" (I23). In fact, as shown in Figure 4.6, this sentiment about the ownership of the conservation areas is very clear across households from both GRs. Even outsiders, like the KWS Warden responsible for the area remarked that "it is very clear that they [conservation areas] belong to the community and that it was their decision to have them."

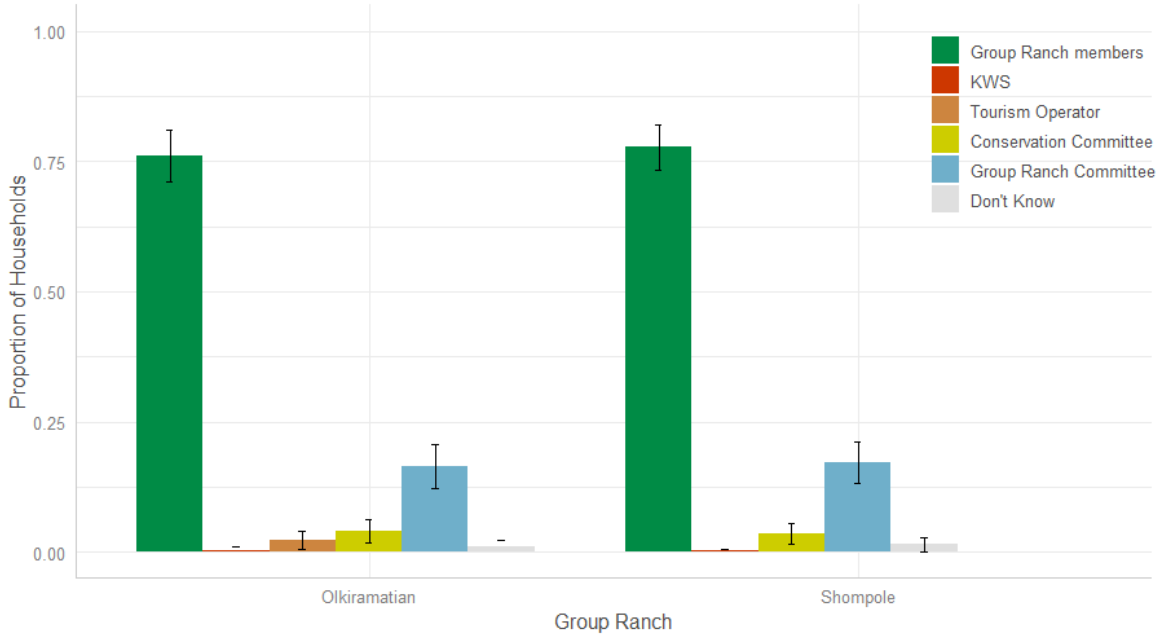


Figure 4.6 Household survey responses when asked "Who owns the conservation area?" Error bars denote 95% confidence intervals.

Currently, both GRs continue to manage the location of settlements inside and outside the conservation areas, in response to changing environmental conditions and livestock grazing requirements. Seasonal grazing occurs within the core and buffer of the conservation areas during dry months (usually September to March) but is tightly coordinated and controlled by local governance committees. Ordinarily, during the wet months (usually April to August), settlement is not permitted within the core and buffer of the conservation areas. Wet season settlement is confined to permanent homesteads in seven areas within the livestock rearing zone on the eastern side of the Ewaso Nyiro River. The governance processes behind this allow as understanding of how these rules about settlement impact resilience to drought, and

how the role the conservation areas play in this, which I explore in detail in Chapter 5.7.

4.10 Summary

In this chapter, my aims were firstly to provide an important broad historical context to conservation, droughts, livelihoods, and changing land tenure in Kenya, for any further interpretation of the South Rift social-ecological system, and secondly, to give a detailed overview of the provenance of conservation in the South Rift.

To understand conservation in the South Rift today, the historical context and baseline are critical. Using appropriate interdisciplinary methods, I believe I have shown that during the colonial and early post-colonial period, the South Rift remained on the periphery of Kenya's protected area estate. I have also shown that the areas of the South Rift which are now conservation areas have been treated differently to other parts of the GR for several decades, at least. People practised cultivation along the escarpment, livestock herding in the rangelands to the east, and as best as I could determine, people have used today's conservation areas as drought grazing refuges for at least the past several decades. This appears to have been predominantly because of the presence of high tsetse fly densities in this area. This means that the acceptance of conservation areas with access to grazing during droughts, did little to affect the spatial distribution of people's livelihoods. Perhaps most importantly when compared to other conservation initiatives, people were not moved out of an area for the sake of conservation, either directly (Brockington, 2002) or indirectly (Bedelian, 2014; Cavanagh et al., 2020).

State-imposed forms of protected area conservation, that spatially separate local people from conservation areas, are the principal target for criticism about unjust conservation (Brockington et al., 2008; Gardner, 2016; West et al., 2006). However, some question whether community conservation can also be a case of "disciplining local people to exclude themselves from their own land" (Igoe and Croucher, 2007:538), particularly when tied to eco-tourism territorialities (Bluwstein, 2017). I believe that I have shown that the South Rift is, at the moment, a different case.

Firstly, the vast majority of people living in the South Rift believe that ultimately they maintain ownership of the conservation areas (Figure 4.6). Secondly, these conservation areas have not altered the land use strategies that the GR had previously set out. Thirdly, maintaining access to the conservation areas as drought grazing refuges was clearly set out as an important factor in discussions about the conservation areas

from the start. When land and natural resource management is taken away from local communities, through conservation, or privatization and sale, or other means, it harms food security and reduces the necessary flexibility in resource use which allows people to cope with variability (Igoe and Brockington, 1999). The opportunities afforded by conservation and eco-tourism were to be additional and secondary to traditional land uses and culturally important livelihoods such as pastoralism and irrigated cultivation. Finally, in the broad sense, communities in the South Rift are neither inactive, nor homogeneous in dealing with conservation areas and eco-tourism investments. When their options are limited, they are willing to show their agency, weaponise, and reject what they do not want, through the use of what Scott terms "weapons of the weak" (Scott, 1985).

In the South Rift there was "no pressure from the outside to concede to wildlife, but simply seeing it [wildlife] as something that they have lived with, they benefited from in the past and they can benefit from in a new way in the future, so long as it fits within their terms of what they can manage" (I45, also I43). This does make this area different. Indeed, it means that conservation areas cannot be "set aside against the will of the local people like Amboseli [the National Park in Kajiado] was" (I45).

The final mix of these factors is a form of community conservation, embedded in a working landscape, far removed from the notions of full spatial separation between people and wildlife. Instead, the functionings of conservation and eco-tourism mean that people use the landscapes of their GR in much the same way as they did before the conservation areas, with livestock and wild animals using spatially and temporally variable resources across the landscape (Tyrrell et al., 2017), with livestock using the conservation area in periods of drought (Russell et al., 2018), and with cultivation taking place in the areas suitable for irrigated cultivation. The challenge of co-existence with wildlife within this context is possible through the spatial and temporal partitioning and sharing of the landscape (Schuette, 2012; Western, 2018).

When in this form, conservation in working landscapes becomes an additive form of land management, practised within the context of local knowledge and practices, which is crucially secondary to culturally important livelihoods and land uses (Western et al., 2020). Yurco (2017) has shown that land managers and conservationists in Laikipia have aligned livestock production goals with conservation efforts. By contrast, the inverse has prevailed in the South Rift where conservation goals must align with locally important livelihoods.

Of course, this means that it becomes part of the dynamics of the complex social-ecological system and subject to moments of crisis and conflict which then need to be discussed, negotiated, and overcome, if conservation is to continue. This brings up another key point that has emerged in this chapter; a regular return to traditions and culture in the struggle between modernisation and holding onto tradition. This theme will be explored further in Chapter 5 in the context of governance. In this chapter the series of events I have described suggest that there were (and are) struggles between external and internal ideas and actors, and struggles between a push to modernise, or to hold onto traditions. As described above, the compromise in the context of the conservation areas appears to be one where modern ideas about conservation exist, but without undermining the essence of traditional practises (Western et al., 2020).

This chapter has also revealed several important points from a historical context. Firstly, significant droughts of the past were named, and are still vividly recalled, but more recent ones are not. Four droughts in particular were notable for the coping mechanisms that people used, as well as the effect they had on influencing debates over land tenure in Kenya's rangelands. In discussions about these past droughts, elders offered no suggestions as to why more recent droughts, which they felt were just as severe on their livestock, were not given names. They vowed that recent droughts would be named, so that they might be remembered clearly. I have recorded the suggested names in Table 4.1.

Furthermore, the historical look back revealed that the Magadi Soda Company played a large role in altering the ecosystem of the South Rift, through the felling of large swaths of trees in this dry landscape, and by abstracting water from freshwater streams, and altering the distribution of water across the ecosystem. These significant large-scale effects will affect further analyses of long-term changes to the social-ecological system.

In Chapter 5 I will discuss how modernisation processes have resulted in hybrid institutions of governance. I will then look at the social-ecological system changes in Olkiramatian and Shompole with regards to their conservation areas, and examine whether these have changed social-ecological resilience to drought in Chapter 6.

Adaptive governance: maintaining desirable and resilient social-ecological systems

> *"Tenelo neshalu enjore nenya nkopit"* | "When an army gets weak, they eat bark," *sensu* habits and actions have to change to circumstance.
>
> — Kipury (1983:199)

> "Control over resources is the ultimate source of power"
>
> — Shivji (1998:48)

5.1 Introduction

People have a long history of developing regimes and rules to protect and preserve their social-ecological system in some desired state (Pilgrim and Pretty, 2013). Whereas colonial and post-colonial thinking tended to focus on state bureaucratic authority as the appropriate means to address the externalities associated with use of natural resources, considerable attention is now given to alternative forms of governance, including decentralised and participatory governance of natural resources (Armitage et al., 2012, 2020; Blaikie and Brookfield, 1987; Borrini-Feyerabend and Hill, 2015; Folke et al., 2005; Lebel et al., 2006; Lockwood et al., 2010). Lemos and Agrawal (2006) argue that decentralised and participatory governance of natural resources can:

1) produce greater efficiencies; 2) bring decision making closer to those affected by governance, promoting higher participation and legitimacy; 3) allow decision makers to use spatially and temporally relevant knowledge about natural resources. Indeed there is extensive work on the ability of decentralised or local groups of people to develop systems of rights and rules to govern the use of shared natural resources, and to connect across scales (Brondizio et al., 2009; Dietz et al., 2003; Ostrom, 1990; Ostrom et al., 2002). These tenure systems are often location-specific, formed through local institutions, which are legitimised by shared values, and they shape the way people use resources in fundamental ways, by distributing rights, authority, and responsibility among various groups in society (Ostrom, 1990).

Governance has become a catchword to describe the plethora of alternatives to centralised control. However, it can accurately capture the ways in which a society comes together to make decisions about the systems of formal and informal rules, principles, and processes to achieving shared objectives in natural resource management (Armitage et al., 2020). Given then that governance modifies social and ecological systems, it can therefore constrain or enhance resilience (Adger, 2000). Rigid governance, where planning and management decisions are unable to easily change and adapt to social-ecological change, decreases resilience and can result in undesirable social-ecological outcomes (Berkes et al., 2003).

On the other hand, adaptive governance, as coined by Dietz et al. (2003), recognises that our knowledge of any social-ecological system is at the very least incomplete, and that scales and modes of governance may shift with changes to biophysical and social systems. Adaptive governance can therefore be understood as "a system of environmental governance with the potential to mediate the complexity and uncertainty inherent in social-ecological systems" (Chaffin et al., 2014:6) through what Folke et al. (2002:8) term a "dynamic, ongoing, self-organised process of trial-and-error."

The outcomes of adaptive governance are considered positive when they maintain a desired social-ecological configuration, over a specific time-frame, and in the context of various stresses (Plummer and Armitage, 2007). This is normative, and implies that some social and ecological states are desired over others (Nadasdy, 2007). To maintain these desired states, adaptive governance requires functioning social networks, social capital, and leadership (Folke et al., 2005). Social networks can provide arenas for sharing and innovation between actors and levels within governance institutions (ibid.). Social capital consists of the relations of trust, reciprocity, common rules and norms, sanctions, and connectedness between institutions and across scales (Adger,

2003; Pretty and Ward, 2001). Leadership can provide the key functions of adaptive governance such as building trust, managing conflict, linking actors horizontally or vertically, compiling knowledge, and mobilising support for change (Folke et al., 2005). Taken together, adaptive governance is one way to manage the tensions between effectiveness, participation and legitimacy while maintaining desired, resilient social-ecological systems (ibid.).

Institutional arrangements for governing natural resources have sedimented themselves in a variety of ways across Africa (Nelson, 2010). In the case of Kenya's rangelands, chronic marginalisation continues to undermine traditional institutional capacity (Elmi and Birch, 2013). Nevertheless, many traditional institutions continue to maintain resilient pastoral social-ecological systems (Davies et al., 2015), through institutions such as clan councils (Robinson and Berkes, 2010), traditional meetings (Robinson et al., 2010), and rules over water and pasture access (Niamir-Fuller, 1998). Such traditional resource management institutions are decentralised and adaptive in that they are based on the means, knowledge, and experience of the resource users themselves (Berkes and Folke, 1998).

Many conservancies in Kenya have been set up in rangelands, often the only areas with remaining large mammal biodiversity that is so alluring to foreign tourists and their money (Tyrrell et al., 2020). Whereas settlement, grazing, and resource access were in the past governed by traditional, informal institutions, these conservation areas have added further institutions of land management, which are eroding and superseding recognised traditional institutions (Pas, 2018). Therefore, there have been calls for further research into how local governance institutions interact with these forms of conservation in rangelands (Yurco, 2017), and beyond (Armitage et al., 2012; Brockington et al., 2018).

My purpose in this chapter is to investigate the governance of natural resources in the South Rift social-ecological systems which includes community conservation areas. To achieve this, I was guided by the following research questions:

1. How do current governance institutions differ from those of the past? What leadership opportunities exist for women in this context?

2. How do local institutions govern in the South Rift social-ecological system?

3. How do local natural resource governance institutions operate through critical junctures such as droughts?

4. How are rules sanctioned and enforced?

To effectively answer these questions, I combine data from interviews with various traditional, modern, formal, and informal leaders. I interpret these interviews together with results from my stratified randomised household survey, and other information gathered during my time in the field, to bridge the gap between rhetoric and reality.

I begin by looking at how current governance institutions differ from those of the past. I then unpack how these different institutions work together. I will then discuss how current governance systems can be best understood as a *bricolage*[1] of governance institutions. Following this, I use several empirical examples to show how this bricolage of governance institutions operates in terms of adaptive governance and coping with change. Finally, I discuss how these institutions maintain their legitimacy, and emphasise that there are important contestations to these systems of governance.

5.2 Institutions of governance in the South Rift

Over time, the Maasai, like many other cultural groups, have developed a set of highly adapted and resilient customary institutions which form the basis of their communities, relationships with each other, and social-ecological relationships (Galaty, 1993; Homewood and Rodgers, 1991). The institutions of clan, age-set[2] and kin relationships built through marriage are fundamental to existing in an unpredictable environment (Goldman, 2006). These social connections are often diffused over large areas but are exercised with strong local knowledge of and identification with the land and natural resources.

5.2.1 Governance of the *ilaiguenak*

In the "Traditional Political Organisation of the Pastoral Masai" [*sic*] (1965:13) Jacobs describes the Maasai as "politically uncentralised", in that they "lack chiefs, village herdsmen, or ... other political authorities". However, Jacobs found that "all political offices in the traditional political system of the Pastoral Masai (*sic*) are based on the age-set system" which "constitutes the [their emphasis] political system" (Jacobs,

[1] A term I will define and elaborate, later in Section 5.4.

[2] Maasai have age-sets (*olaji*) which are formed when two half age-sets (*olporror*), the right hand group (*emurata e tatene*) and the left hand group (*emurata e kedianye*) join, later in life. I will use the general term age-set to refer to all three of these groups.

1965:309). Therefore, the spokesmen of each age-set, the *ilaiguenak loonkishu* (singular: *olaiguenani*)[3] were particularly influential[4].

Both in the past, and still today, the *olaiguenani* of an age-set is chosen by the age-set members of a particular location[5] within their *olosho* (section, e.g. the *Iloodokilani* section) sometimes with the help of their *olpiron*[6] (age-set fathers), but always with their approval and blessing. *Olaiguenani* are chosen based on their lineage, as well as the following desirable characteristics: leadership abilities; impartial and diplomatic mediators who balance the needs of people, particularly the poor; peaceful at heart and looking to keep the peace (*eseriani oltau*); polite, quiet and soft-spoken; knowledgeable about customary procedures; a person whose advice was sought and adhered (I4, I5, I6, I18, I28). Still today, being an *olaiguenani* is regarded as both a burden and a blessing (I4, I6).

In the past, the life-stage of an age-set was a crucial determinant in how much power they wielded, as "the authority to regulate and control the public affairs of a tribe rests almost entirely with members of the junior elders' and senior elders' age-set ... the 'ruling elders'" (Jacobs, 1965:334) or as one informant said "in past, the leadership was only for the elders" (I5). This authority is largely due to the special relationship that these age-sets (junior and senior elders) have, as *olpiron*, over the *ilmurran* (warrior) age-sets below them. In meetings among *ilaiguenak*, or between age-set members, which are chaired by their *olaiguenani*, authoritative decisions are made only when a consensus is reached, that is, when there are no objections to the last opinion expressed; often a long process (Jacobs, 1965:346). In the past, if people were to go against a decision made after such a meeting, the methods of sanctioning included: public ridicule (*akuenyi* or *amor*), the loss of privilege (*alaisho naikarsei*), fines (*sogo*), ritual oaths (*olmumai*), ritual curses (*oldeket*), and when customary laws have been broken, reparations (*alaaki*) and ostracism (*aimalimal*).

[3]The duties of the *ilaiguenak* are to preside over (*aiguenaki*), to discuss (*aiguena*), and to advise or council (*aigwen*) their age-set (Jacobs, 1965; I4, I6, I18, I28).

[4]Other important people in an age-set are the *olotuno* who is selected by the *olpiron* elders with the age-mates, and they manage all the customs that age-set must go through until they graduate to elderhood.

[5]An age-set spokesman is referred to as *olaiguenani loonkishu* or *olaiguenani lolaji* in some places; and a most revered spokesman is *olaiguenani kitok*.

[6]These are their spiritual fathers (similar to god-fathers), two half age-sets above the age-set of their sons.

5.2.2 Changing governance of the *ilaiguenak*

Many of the current *ilpayiani* (male elders) fondly exclaim "the leadership of the past was good!" (I5, also I8, I14, I26). According to a current administrative chief, the traditional leaders of the past were "very powerful, like *olaiguenani*, when these people said anything to the community, the whole community would have to adhere" (I30). However, this unquestionable authority is waning (I5, I30). Young elected leaders recognise that "at that time, that was right, but at this particular time this [new form of governance] is also right because we are moving with the changes" (I33). Jacobs (1965) found that the political values of the traditional systems of governance of the past were based on 1) equality between age-mates; 2) consensus building; 3) respect and deference to seniors; 4) obedience from *olpiron* sons; 5) disdain for the use of physical force as a means of seeking compliance. However, the foundations of several of these values are being eroded.

Although formal school education has had many positive impacts, several people emphasised how education was creating inequality, and in so doing, undermining traditional leadership. For instance, one informant offered the following graphic description: "the person who has been educated, he is a carnivore who eats others ... instead of helping people, they eat" (I11). The growth in the influence and authority afforded to elected representatives, as discussed below, has resulted in a shift in decision-making from consensus building, to majority wins. Elders recognise that "at that time people were few ... the number of people is not like it is now" (I5) and that consequently, achieving consensus is difficult. Many elders lament that there are now too many different governance institutions (I5, I8, I12, I14, I16, I26; see Figure 5.1). These same elders also lament that respect and obedience are being lost, to them, "respect has been eaten by a dog" (I14), but it is hard to know the extent to which this could be elders harking back to an idealised gerontocracy.

Nevertheless, my interviews suggest that the *ilaiguenak* still maintain many important functions and continue to hold authority in different ways. The current *ilaiguenak* recognise that they are a different kind of leader to those who have been elected or appointed by the government (see Figure 5.1 for leaders who have been elected or appointed), and they are therefore seen to be apolitical, emollient, and free of neopatrimonial temptations (I4, I6, I18, I28). This affords them a different form of authority, free of what is regarded as "dirty" politics. They govern through advice and council, and not through autocracy. They can be called upon by other leaders to offer

advice, or to mediate, but never to involve themselves in "doing": "the leaders ... we help them ... but we, ourselves, are not working, no, this is not our work. But we have eyes to manage what we see, and we have mouths to mediate ... that is what we do" (I6). Their views on an issue are taken very seriously, "if I stand and say we shouldn't do this, many people will listen to what I say" (I18).

Furthermore, given that they work through the age-set system, their influence cuts across many other institutions. For instance, they cut across geographic space: "right now, I *must* (their emphasis) be informed of any function involving the *Ilkitoip* [age-set]. They come and explain what they are doing. Even people in Torosei [neighbouring Group Ranch], they come to tell me" (I28). As the leaders of an *olpiron*, from whom the age-sets below seek guidance, they also cut across generations (time). Their *olpiron* sons still seek approval before accepting new appointments, or a blessing during cultural events, and most importantly, before any significant cultural event, such as starting a new age-set (I4, I6, I18, I28).

Finally, the current *ilaiguenak* continue to play a particularly important role in managing grazing and settlement: "the *olaiguenani loonkishu* (spokesman of the cattle *viz.* of the people), like me, is the leader of things like settlement, like livestock management. If it is said we will not graze here this year, because of the drought, it is our job [to ensure people follow these agreements] ... people don't look to the administrative chiefs [other leaders], they look to us ... that is why we are called *olaiguenani loonkishu*" (I18, also I6). However, the *ilaiguenak* are not directly involved in many other decisions that happen at the Group Ranch (GR) or location level, and they are not routinely involved in GR Management Committee or Subcommittee meetings (I5, I30, I38).

Therefore, the age-set system and the *ilaiguenak* can now no longer be regarded as the sole political system (Jacobs 1965) in the South Rift, although their important role as binding cultural agents continues to be recognised: "we are still held together by our customs, our culture is still strong ... the *ilaiguenak* act as a unifying factor, so we need to include them" (I33).

5.2.3 Traditional clanship system (*ilgilat*)

Maasai families are traditionally affiliated to a clanship (*ilgilat*) system, where relations are predominantly patrilineal, or matrilineal in certain situations. In Maa tradition, social identity is dependent on clan affiliation, and clan ties and obligations

are given great weight. Clan affiliation is critical to many culturally important practices, from paying (or receiving payment) for spouses, to being allowed to migrate to a new area, or offering another form of social security. Larger clanship meetings are occasionally held at the level of the location, with many smaller meetings between clan members happening on a regular basis. Across both Olkiramatian and Shompole, *Ilmokasen* and *Ilmollelian* are the most common clans, but other clans in the area include *Laitayiok*, *Laiser*, and *Ilmeponyi* (R48). Clans are not locality based, and so the same clans are generally found throughout Maa speaking areas. This provides a network of family-like ties, with their resultant traditional access to natural resources, which cuts across age-sets, and *iloshon* (Maa sections) and over a vast geographical area, as represented in Figure 5.1. Clans can have their own *ilaiguenak* (Goldman, 2006), but in the South Rift, they were never mentioned in discussions about governance.

5.2.4 Administrative Chiefs (*ilaiguenak loonkraoni*)

In Kenya, the British colonial powers appointed local chiefs, or headmen, to provide a day-to-day presence, and to be the local administrative functionaries of the district administrators, and ultimately, the colonial government (Berman, 1998; Spear, 2003). The current system of administrative chiefs is based on the same system, and in the South Rift, the administrative chiefs are still referred to as *nkraoni* chiefs - those of the crown[7]. Up until the 1970s, the sole administrative chief of the *Iloodokilani* Maasai *olosho* (section) was based in Mile 46, a town that was at least two days of walking away[8] (I5, I8, I12, I14). The first administrative chiefs appointed[9] from Olkiramatian and Shompole were Ntumuna Ole Kolei and Lesale Pariken, respectively (I5, I12, I14). These were appointments of the District government, chosen from the wealthiest families, as elders recall that some people had instead wanted another well respected, impartial, but poor elder, Ole Nashilu, as the government chief (I5). Their

[7]This is in reference to their introduction in the days of British colonial rule in Kenya. In some places they are still referred to as "the clothed ones" or *a-rrida* from the word that the Maa used for the Swahili, referring to the fact that they were covered up. This term is still used to refer to people covered up by western style clothing.

[8]Jacobs (1968:4) talks of the ultimate authority for the South Rift area as residing with "Chief Maora"- the nominal head of the *Iloodokilani* Maasai "whose territory extends up to the Nairobi-Arusha road just south of Kajiado." Interviewee I5 confirms that this was Maora Ole Loorpisia, who was appointed under the Chief's Authority Act, as Maora Lolpisia, Chief of the Lodakelani, on the 1st April 1961, according to Gazette Notice No. 1690 in The Kenya Gazette of 5th May 1967.

[9]It is not clear exactly when, but it was around the late 1970s or early 1980s. Using the time line in Figure 4.1 with elders, I was able to confirm that it was just before the 1982 attempted coup in Kenya.

formalisation was simple, they were given a uniform, and at a meeting of elders, they were told that "this person who is clothed (in uniform), he is a chief" (I14). However, even if the government wanted something, the administrative chiefs would have to first meet with the *ilaiguenak*, because at that time, they still had the greatest authority (I5, I8, I12, I14).

The current administrative chiefs describe how they are part of a strictly hierarchical system, from the sub-location, all the way to the office of the President, through a "chain of command" (I30; see Figure 5.1)[10]. Whereas in the past the appointment of an administrative chief was related to their perceived power and influence within the community, today chiefs are selected after an interview process where level of formal education and local influence are taken into consideration (I5, I26). Administrative chiefs are paid by, and responsible to, the central government, but they are embedded within the community (I36; Figure 5.1). In the South Rift, the primary functions of the administrative chiefs are to maintain law and order, coordinate national government objectives at a local level, ensure that the Constitution of Kenya is adhered to, preside over public functions, and communicate policies from the national government to the local level (I14, I30, R48). The chiefs have the support of other branches of the Office of the President, including the "Administrative Police ... [who] are supposed to be the people to help the chiefs ... in implementation of law and order" (I30).

[10]One administrative chief described how a message can pass from the President of the Republic to "the interior minister, who then ensures that the permanent secretary brings that message to all regional commissioners, then from regional commissioners to county commissioners then county commissioners to deputy county commissioners, then to assistant county commissioner, from there to us *nkraoni*, and onto our assistant *nkraoni*, and to the village elders" (I30).

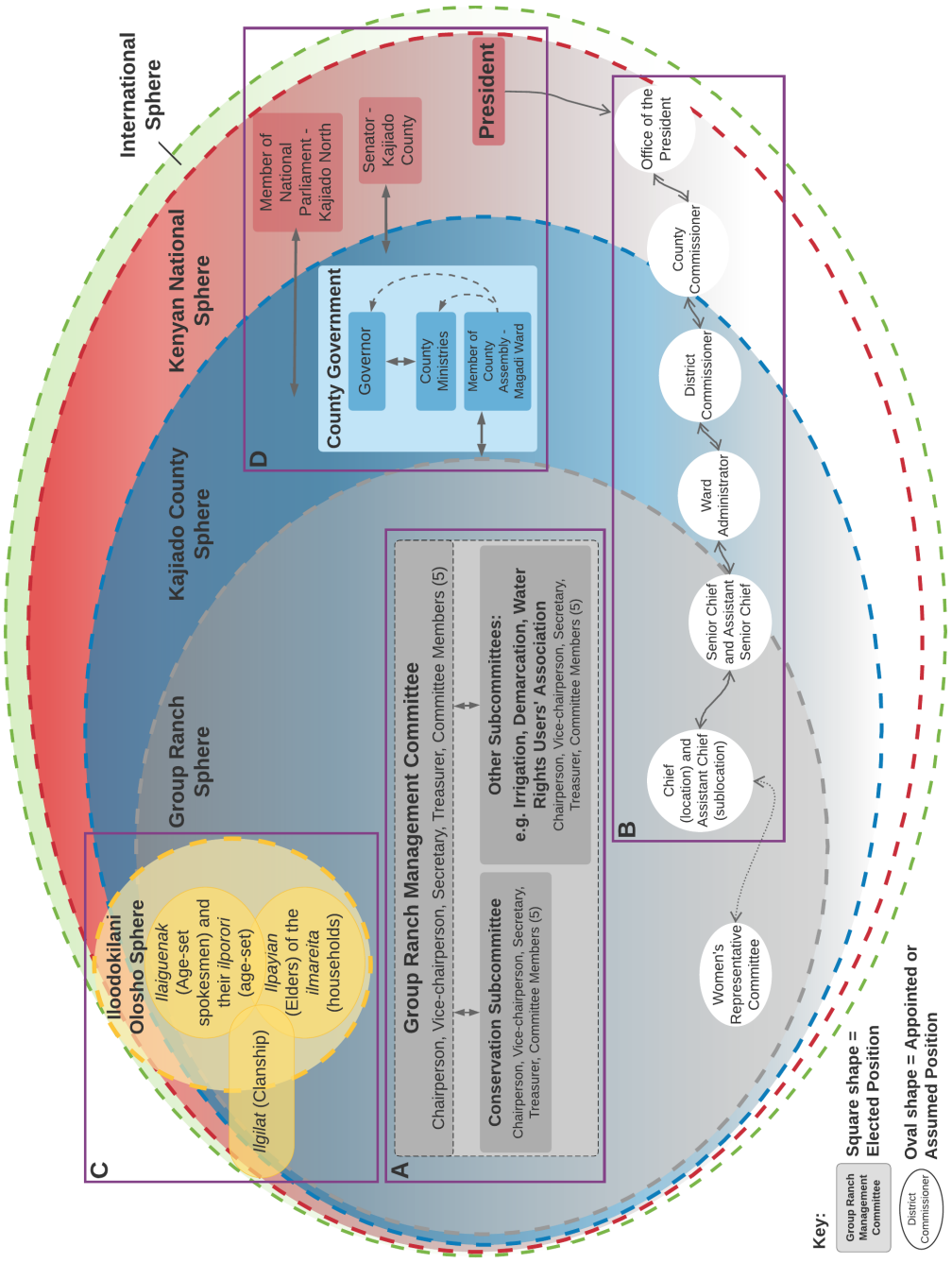


Figure 5.1 Configurations of governance in Olkiramatian and Shompole. (A) The elected GR Management Committee, together with their Subcommittees, including the Conservation Subcommittee. They are at the heart of the governance of natural resource, but only within the sphere of the GR. (B) The chain of command from the Office of the President to the sub-location based assistant administrative chiefs. They transition across the GR and the County to relay information and power from the national level to the sub-location level and back up. (C) The *olosho* of the *Iloodokilani* is made up of all *Iloodokilani ilaiguenak*, their age-sets (*ilpororri*), their households (*ilmareita*), and their elders (*ilpayiani*). The *olosho* goes beyond Olkiramatian and Shompole, beyond Kajiado County into Narok County, and beyond Kenya into parts of Northern Tanzania. Furthermore, all families are part of clans (*ilgilat*) which connect them to other Maa people across county and international boundaries. (D) People are also represented at the county and national level through various elected representatives. Most of my analysis concerns local leadership who are active in the "Group Ranch Sphere."

5.2.5 The Group Ranch and its Management Committee

In Chapter 3.4 I gave an overview of the historical context of GRs. To reiterate, the GR was recognised as a legal representative entity for a group of land owners, under the Land (Group Representatives) Act of 1968 (Government of Kenya, 1968). Although this has now been legally superseded by the Community Land Act of 2016 (Government of Kenya, 2016), very little has changed yet[11]. As Galaty (1980:166) observed in Kenyan Maasailand, even as early as the 1970s, the GR was regarded as just another institution to be controlled by existing instrumentalities: "rather than being replaced by it, such institutions as clanship, age-sets and territorial segments provide the principles which constitute the actual social order of the Group Ranch." Galaty (1980) argues that traditional institutions themselves therefore provided the substance of the GR order amongst the Maasai.

The GR therefore appears "to represent a positive innovation precisely because of its limitation, for in the cracks and crevices of its organisation, Maasai may be able to make it work through their own system. What it promises them is the security and the time to generate innovations appropriate to their needs" (Galaty, 1980:169). In the rest of this section, I will describe the more recently introduced governance institutions in the South Rift, in an attempt to investigate the extent to which this optimism has persisted in the South Rift, where the GRs have not subdivided.

In both Olkiramatian and Shompole Group Ranches[12], the registered members of the GR elect a Management Committee to represent the group, and to run the affairs of the GR, an event I witnessed in Olkiramatian in 2018 (shown in Figure 5.2). Although in the past the GR representatives were sometimes voted in by registered members of the GR, and sometimes appointed by the *ilpayiani* (R48), the election process is now enshrined in their Constitutions (see Table 5.1 for a condensed version of the Constitutions, and Appendix G.1 for the complete table). Figure 5.3 shows that in the most recent GR elections in both Olkiramatian and Shompole participation rates were very high, with a large proportion of registered members voting (86.4% in Olkiramatian [95% CI: 81.5 - 91.2], and 96.0% in Shompole [95% CI: 93.8 - 98.2]). Vying Management Committees canvass registered members in the build-up to an election.

[11]There is currently a state of legal limbo and confusion surrounding the Community Land Act. In the mean-time the reality is that very little has changed on the ground, as of 2019.

[12]Although technically they are now Community Land, based on the realities on the ground, and for simplicity, I will continue to refer to them as Group Ranches (GRs).

Adaptive governance: maintaining desirable and resilient social-ecological systems

In the most recent elections in Olkiramatian, the vying groups circulated manifestos, outlining their key goals, as shown in Figure 5.2. Management Committees put themselves forward "as a team" (I38) which is already fully formed with candidates for all the positions on the Management Committee, as well as candidates on the most important Subcommittees, so that in effect, they "elect all the representatives of all the committees ... on the same day" (I33). The candidates themselves are chosen through a constant process of politicking in the build-up to an election[13] (I22, I38).

The composition of the Management Committee is partly defined by the Constitution (Section on Composition in Table 5.1). However, unofficially, each Management Committee also tries to include representatives from each location in the GR, as well as representatives from the important age-sets and clans: "for age groups there's *Iseuri*, *Ilkitoip*, *Ilkishiru* and *Ilnyankulo* so that we represent people well, then we also have clans, and we need to have all the clans represented in the committee" (I3). Representatives are elected for a fixed term[14] of five years (Section on Limits to Term in Appendix G.1), as "you know when you stay for a long time, you will fall asleep" (I3). The elections themselves are done through queueing, where "the number of members [present] are counted, and then they stand in a line [behind their chosen candidate], they add up the numbers [from each line] ... when they finish, they announce who has won" (I33; Figure 5.2).

The Management Committee see themselves as "the representatives of the larger community in terms of land and the resources of the Group Ranches" (I27). Anything related to land is seen as their responsibility, including livestock production, cultivation, and eco-tourism partnerships: "we [the Management Committee] are the ones in charge of the land, the chiefs [administrative and *ilaiguenak*] have no responsibility for land, they are in charge of people" (I7). In this sense, as has been reported in other places (Rutten, 1992; Southgate and Hulme, 2000), the GRs in the South Rift have taken

Figure 5.2 Announcing the 2018 Olkiramatian Management Committee election results (left) and the front page of the winning committee's manifesto (right). Pictures by Peadar Brehony.

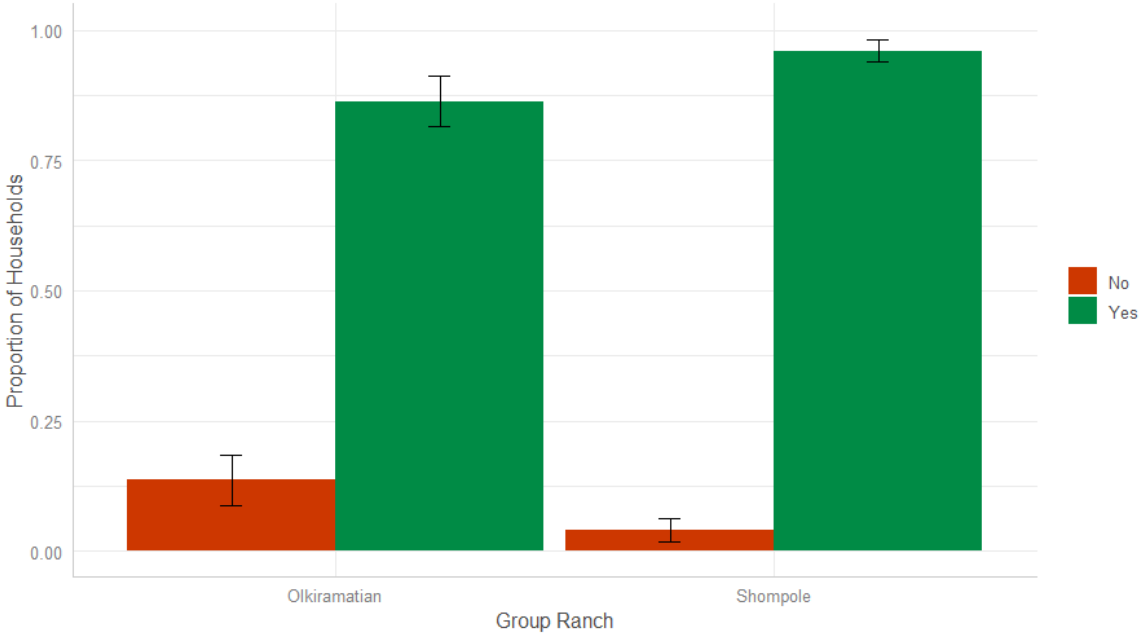


Figure 5.3 Proportion of households who voted in the last Group Ranch Management Committee Elections. Error bars denote 95% confidence intervals. N.B. only registered members can vote, so only they were asked.

some authority away from the traditional institutions.

5.2.6 Group Ranch Subcommittees

The Management Committee can appoint Subcommittees to deal with specific issues. These subcommittees are subordinate[15] to the Management Committee (Section on Subcommittees in Table 5.1), a point acknowledged by chairpersons of the subcommittees "we [conservation subcommittee] work under them, because the management of the land is through the Group Ranch" (I38, also I23).

The subcommittee of greatest relevance to this research is the Conservation Subcommittee, whose principal role is understood by both GRs as ensuring that the conservation areas function as they are intended (I33, I38). These tasks include liaising with eco-tourism lodge operators (e.g. inform them of decisions about settlement, discuss employment), supporting the scouts to monitor the conservation areas, and liaising with KWS when required (I31, I36). The Conservation Subcommittees of both Shompole[16] and Olkiramatian have their own bank accounts and receive some of the income from the conservation area. Initially, any income from the conservation area goes into a holding account where the signatories are the Chairperson of the GR, and the Chairperson of the Conservation Subcommittee. From there, money can be released into the Conservation Subcommittee account if it is from conservation or camping fees, and into the GR account[17] if it is from lease fees or bed night fees (I33, I38, I22, I23). The GR account also holds money from other partnerships or land leases, as well as "cess fees," the charge per head of livestock brought in to be sold at their busy weekly

[13]My own research assistants were approached several times while we were working, by different, competing election teams. One ended up being elected into a powerful position on the Management Committee.

[14]This was not always the case, before there was a sentiment that "the elections or appointments only happen when members make noise" (I3).

[15]This pointed clarification in the constitutions of both GRs is likely due to historical disputes (see Chapter 4.8).

[16]This is actually the Shompole Conservation Trust, but is effectively treated as, and referred to as a Subcommittee of the GR.

[17]The ways in which this income is used can be found in Chapter 6.6.

markets (I23, I27, I38, I42).

5.2.7 Constitutions of the Group Ranches

As already alluded to, both the GRs studied have voted to accept constitutions. In the case of Shompole, the lengthy process of democratically accepting a constitution was informed by the previous failure of the GR's partnership with the eco-tourism operator (I23, I27; see Chapter 4.8). It was principally to be a guideline for governance (I1, I11, I23, I27, I33), whilst also being an attempt to hold leaders accountable, and to fight perceived corruption: "we were having issues on leadership and management matters ... [leaders] overstay in an office ... or are criticized, but somehow re-elected again. Also the resources and the projects [conservation and eco-tourism] we were having failed ... we learnt our lessons about having poor governance without guidelines, so we thought of having a guideline of sorts, of a document like that one, of a constitution, to try and govern us" (I27).

In the case of Olkiramatian, they followed the lead of Shompole, and the recommendations of the Community Land Act 2016 (Government of Kenya, 2016), and after several years of discussion and negotiation (I1, I11, I33), they voted to accept their own constitution whilst I was conducting fieldwork (R48). All the crucial aspects of the two Constitutions, as they relate to this research, are set out in Table 5.1 including: land zonation; entitlements of members[18]; how shares can be inherited; rules for elections; the criteria, duties and term limits for elected management committees; the role, composition and oversight of subcommittees; penalties and sanctions for rule breaking (also see Appendix G.1). The Constitutions also make it difficult to dissolve the collective land holding as in both Olkiramatian and Shompole, at least 75% of registered members must be present to hold a vote on this, which the current Management Committees see as "something that is not possible" and so "any greedy chairman will find it very difficult" to trick people into subdividing (I27) (Section on Dissolution in Appendix G.1). In both cases, even if the areas were to be subdivided, the constitutions include clauses which prevent the Conservation Area from being subdivided (Appendix G.1).

As mentioned previously, I attended the Olkiramatian Community Land elections during my fieldwork and witnessed how important the recently adopted Constitution was in dictating the process. These Constitutions are instruments of governance,

[18]In the case of Olkiramatian, this is tiered.

which demonstrate self-organisation and adaptive governance in changing times. The Olkiramatian Constitution has also, for the first time, ensured that two women are now on the Management Committee. Yet, at the same time, it is striking that these constitutions limit the participation of some community members, primarily women, by limiting voting to registered members, who are almost exclusively men. Given the current rules for the inheritance of shares (Section on Inheritance of Shares in Table 5.1) this is unlikely to change any time soon. Many current members have placed significant trust in them as a governance panacea, but it is still too early to tell as Olkiramatian's Constitution has only recently been adopted, and Shompole has not had any successful and lucrative partnerships with lodge operators since they adopted theirs.

Table 5.1 Excerpts from the Olkiramatian and Shompole constitutions, based on signed copies of the constitutions: SORALO/2011/1 and SORALO/2018/2. A more complete table of excerpts can be found in Appendix G.1.

	Shompole Group Ranch Constitution	**Olkiramatian Group Ranch Constitution**
Approved	2011	2018
Zonation of Land	The Group Ranch shall be zoned into various land use areas to provide for effective management of the natural resources including but not limited to: · Grazing; · Conservation (wildlife and nature conservation and eco-tourism related development projects); · Settlement; · Pasture banking. All members are bound to act by these zoning provisions without any exception whatsoever.	The community land shall be zoned into various land use areas to provide for effective management of natural resources including but not limited to: · Grazing; · Conservation (wildlife and nature conservation and eco-tourism related development projects); · Settlement; · Pasture banking. All members are bound to act by these zoning provisions without any exception whatsoever.
Entitlements of Registered Members	All members are entitled to: · Reside free of charge with family and dependents; · Permit others to reside with them; · Speak, be heard, and vote at general meetings; · Receive all publications by the GR; · Inspect accounts and documents of GR; · Receive service from GR representatives; · Hold an office as representative; · Shares in the ownership of the land; · Use the land, water, machinery, facilities, services, and assets of the GR; · Pledge their own private property for any loan.	All members have user rights. Category 1 members are entitled to: · Reside free of charge with family and dependents; · Permit others to reside with them; · Speak, be heard, and vote at general meetings; · Inspect accounts and documents of community; · Receive service from community representatives; · Hold an office as representative; · Shares in the ownership of the land; · Use the land, water, machinery, facilities, services, and assets of the community; · Pledge their own private property for any loan; N.B. Individual ranch holders have land as part of Phase 1 and only their own ranches in Phase 2. Category 2 members (Other forms of obtained membership including special registration as invited members and those approved on the pending member list.) are only entitled to: · Equal portion of land in Phase 1; · Equal opportunities in Phase 1; · Vote if in the community land register; · Their voice being heard. Also, the community land or interests therein may be charged as security for any loan for the purposes of developing the area, and not for any other purposes, with the approval of the community assembly, all the community representatives and the registrar of the community.
Inheritance of Shares	· A male child of a member is automatically registered as a member of the GR. · A widow will inherit her husband's share of the GR, if he was a member, and if she becomes residual household head.	· One inherits membership by being a member of the deceased's family. · If the deceased was polygamous, the wives shall only enjoy the rights to the resources including land that belonged to the deceased but they shall not become new members themselves neither shall they be eligible to vote.

	Shompole Group Ranch Constitution	**Olkiramatian Group Ranch Constitution**
	· If the deceased member was polygamous, the widows shall each inherit equal portion of the member's share of the GR. · If the deceased has only an unmarried female child, they will receive automatic residence and user rights.	· If a member dies and has one wife or husband, they inherit the deceased's membership. · Disputes resolved by the management committee, elders, administrative leaders, or community assembly.
Election Process	Direct voting by calling of all registered members names, and queueing; the candidates who obtain a simple majority shall be deemed to have been elected. Process is presided over by the Registrar of Group Ranches.	Direct voting by calling of all registered members names, and queueing; the candidates who obtain a simple majority shall be deemed to have been elected; no voting by proxy. Process is presided over by the County Registrar of community land.
Composition of Management Committee	Members elect 10 representatives, who simultaneously serve as the Management Committee, and carry out duties as given under the constitution and Land (Group Representatives) Act. The Management Committee includes: Chairperson, Vice-Chairperson, Secretary, Treasurer, and six others. The Management Committee may appoint subcommittees to deal with specific issues, which are subordinate to the Management Committee.	Members elect 15 members, who simultaneously serve as the Management Committee, and carry out duties as given under the constitution and Community Land Act. The management committee includes: Chairperson, Vice-Chairperson, Secretary, Treasurer, and 11 others. Of these, two positions are reserved for women representatives, one position for a special need representative. The Management Committee will appoint subcommittees who will be semi-autonomous but report to the management committee.
Leadership Forum	N/A	The executives of the management committee; Chairpersons of the subcommittees; Age set leaders (*ilaiguenak*); Administrative chiefs (*nkraoni*); Member of the County Assembly.
Meetings	Annual General Meeting: · Once a year in July with 21 days' notice; a quorum of 2/3 of all registered living members present; chaired by the registrar. Special General Meeting: · Convened at any time with 21 days' notice in exceptional circumstances; a quorum of 60% of all registered living members present; chaired by the registrar. Public Meetings: A public meeting called to discuss issues relevant to only a particular number of the community.	Community Assembly: · Once a year in August with 21 days' notice; a quorum of 2/3 of all registered living members present; chaired by the registrar. Special Community Assembly: · Convened at any time with 21 days' notice in exceptional circumstances; a quorum of 2/3 of all registered living members present; chaired by the registrar. Public Meetings: A public meeting called to discuss issues relevant to only a particular number of the community.
Penalties and Sanctions	The Management committee are responsible for imposing penalties, in accordance with the constitution, through a disciplinary committee. A disciplinary committee will determine if penalties are to be imposed when a member is accused of the following offences. The suggested are also included:	The Management committee are responsible for imposing penalties, in accordance with the constitution, through a disciplinary committee. A disciplinary committee will determine if penalties are to be imposed when a member is accused of the following offences. The suggested are also included:

Shompole Group Ranch Constitution	Olkiramatian Group Ranch Constitution
· Settlement in an area set aside for another specific use, for example a conservation area, reserve for calves, grazing area reserves as a refuge from drought etc., shall be a fine of KSh 5,000 · Using water allocated for human beings or calves, shall be a fine of KSh 5,000 · Illegal collection of firewood, sand, stones, grass or charcoal burning dead wood, for commercial purposes, shall be a fine of KSh 20,000 and the material returned for community projects. Dumping of any type of waste in the Group Ranch shall be dealt with in accordance with the relevant laws of Kenya e.g. NEMA, KWS, etc.	· Settlement in an area set aside for another specific use, e.g. a conservation area, drought grazing reserve etc., shall be a fine with the amount determined by the grazing committee. · Using water allocated for human beings or calves, for any other uses, shall be a fine with the amount determined by the grazing committee. Dumping of any type of waste in the community land shall be dealt with in accordance with the relevant laws of Kenya e.g. NEMA, KWS, etc.

5.2.8 Elected representatives

In the past, people in the South Rift elected councillors to represent them in local government (for a detailed overview of the role of councillors in Kenya, see Moss, 2016). This system changed after devolution was formalised in the 2010 Constitution of Kenya[19]. Kenyans now elect a Member of the County Assembly (MCA) to represent them in their County Assembly, a county Governor[20], as well as a Member of Parliament (MP)[21] and a Senator[22] to represent them in the lower and upper houses of National Parliament.

In the South Rift, the elected MCA represents the interests of people from four GRs in the Magadi Ward (Olkiramatian, Shompole, Oldonyio Nyokie, Olkeri; I21, I27) in Kajiado County's Assembly. During my field research I saw that the MCA regularly attended local meetings and functions, and the county Governor occasionally came for a quick visit in a rented helicopter, but I was never aware of the MP from Kajiado West, or the Kajiado Senator, paying any visits. The MCA for Magadi Ward mentioned that the GR Management Committee, the administrative chiefs, and the *ilaiguenak* were "opinion leaders" (I21) and were key to his election. He therefore regularly consulted them for advice on which developments to push, and also asked them to be involved in project implementation, to "make sure the right thing is done." Likewise, the leaders

[19]The decentralisation of government power has now given counties greater authority, each having their own elected governor and assembly.
[20]This was Joseph Ole Lenku after the 2018 elections.
[21]This was George Risa Sunkuyia representing Kajiado West after the 2018 elections.
[22]This was Phillip Salau Mpaayei after the 2018 elections.

came to the MCA with proposals for new projects. It is also important to mention that the MP is the patron of the Constituency Development Fund (CDF), a significant fund of money provided by the central government to support constituency level development projects (I30) and that in Olkiramatian and Shompole, the administrative chiefs are given responsibility for ensuring that these projects are successfully implemented (I30).

5.2.9 Other stakeholders: Parastatals, NGOs, Eco-tourism Lodge Operators

In this research, the most visible other stakeholders in Olkiramatian and Shompole were the Kenyan Wildlife Service[23] (KWS), the African Conservation Centre, the South Rift Association of Land Owners (see Chapter 4.8 for how these NGOs began their partnerships in this area) and the eco-tourism lodge operators for Lentorre Lodge in Olkiramatian and Shompole Wilderness in Shompole. The local KWS managers reported that they regularly met and worked with various leaders, including the GR Management Committees, the administrative chiefs, and the Conservation Subcommittees, as well as occasionally with the *ilaiguenak* and the *ilpayiani* (I44, R48). The NGOs and the eco-tourism lodge operators reported that they worked most closely with the GR Management Committee, and to a lesser extent the Conservation Subcommittees, but rarely with the administrative chiefs, or the *ilaiguenak* (I31, I34, I35, I36, I43).

Some individuals who work for these NGOs, or the lodges are also members of the GR Management Committee, or Subcommittees. However, they and other leaders told me that neither the NGOs, lodge operators, nor KWS were consulted when a decision about settlement or grazing was being made, including the decision to open up settlement in the late dry season grazing area in the conservation area (I31, I34, I35). Nevertheless, although there is no official consultation, given this overlap, it is likely that there is some informal influence that is exerted in either direction. So for instance, whereas one local leader described how "the best thing about our conservation [is that], even if the investors [lodge operators] come ... their work is to take guests to look around the conservation area, they cannot decide how the conservation area should be" (I38), at the same time, others recounted that they would occasionally delay livestock grazing in the conservation area until after the tourists had finished their morning

[23]Kenyan state parastatal with a mandate to conserve and manage wildlife in Kenya, both inside and outside protected areas.

game drive (I23, I38)[24].

5.3 Women and the realities of participation in governance

Maa culture offers little in the way of leadership opportunities to women, in fact most Maasai men view women as children (Hodgson, 1999). The local women leaders that I interviewed[25] summed up their situation: "women did not have seats [of leadership] before ... You were given away by your father to a husband. You respected them as the head of the family, being a woman" (I32). This cultural perception of women as child-like and inferior to men, continues in many parts of the South Rift, and elsewhere in Maasailand (Archambault, 2016; Goldman and Little, 2015; Homewood et al., 2020). Moreover, and against the constitution of Kenya[26], women continue to be excluded from leadership and governance, in two main ways. Firstly, since the establishment of both Olkiramatian and Shompole GRs, women were excluded from being registered members of the GR[27], except under extraordinary circumstances, such as if a deceased husband was married to one wife, who, upon his death, became the household head, she would inherit his membership (I27). Most of these same rules are now incorporated into the constitutions of both GRs, which continue to exclude most women from GR membership by inheritance, whilst granting them conciliatory residence and user rights[28] (see Section on Inheritance of Shares in Table 5.1). This means that, given most women cannot officially vote in GR elections, their voices are not well represented in a crucial governance arena.

[24]I go into more detail about this informal influencing by external actors in Chapter 6.5.

[25]They included: women's location based representatives, chairladies of women's groups, and church leaders (the full list of interviewees is in Appendix D.1). Unfortunately, I was unable to interview the only female administrative chief in the area, Margret Nadupoi Lemayian. Just before we were due to meet, I was told she fell sick, and was rushed to hospital where she was treated for breast cancer. She sadly passed away in 2020.

[26]Here I refer specifically to Article 27 (3): Women and men have the right to equal treatment, including the right to equal opportunities in political, economic, cultural and social spheres. Article 40 (1): Subject to Article 65, every person has the right, either individually or in association with others, to acquire and own property— (a) of any description; and (b) in any part of Kenya. Article 60 (1): Land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable, and in (a) equitable access to land.

[27]As named individuals in the GR register.

[28]Whereas married women, either in monogamous or polygamous marriages, have a small chance of getting membership, unmarried women can almost never be members.

Secondly, and linked to this, women are excluded from positions of leadership. It remains culturally inconceivable to many people in this area for women to occupy any of the traditional leadership positions described above. However, women are eligible to stand for any formal appointed positions, such as administrative chiefs, and GR Management Committee or Subcommittee positions, a result of what one woman leader called "the education of men" (I32). During my field work, there was one assistant administrative chief position filled by a woman in Olkiramatian (see footnote 25 above), and the newly elected Management Committee in Olkiramatian included one woman (I33).

Nevertheless, women do have informal "women's representative" positions in the community (I19, I20, I29, I32). These are location-based committees which include a chairlady, vice chairlady, secretary, treasurer and committee members from each of the sub-locations. Their function, as they see it, is to "coordinate women," support other women's groups (more on this below), or convince local and national government to support women. So in this sense, they consider themselves loosely associated with the administrative chiefs (see Figure 5.1).

The women I interviewed point out that "men will not be able to know the problems that women are going through. [We] can understand the challenges that women are going through, [we] can ask them 'how can we assist you'" (I32). The committees work together on projects when they need to, but do not have any higher authorities who support their activities (I20, I32). Furthermore, the chairladies of these committees are not elected by "queueing for the line" (I32) described above for GR elections, but are chosen by the other women who attend committee meetings, after a hustings (I20, I29, I32). Several of the current women's representatives have occupied several different positions in their committees, and some have remained as leaders for over 15 years.

In conjunction with the committees of women's representatives, there are numerous women's groups in Olkiramatian and Shompole, which function as merry-go-round groups, or "*osotua*" where the group has small collective projects, or ways to help each other when they face hardships (I19, I29). Of these groups, the Reto Women's Group is the most prominent in Olkiramatian. They are the owners and beneficiaries of the Lale'enok Resource Centre[29], where foreign researchers (including me) and some groups

[29]The centre was set up by the African Conservation Centre (ACC), in partnership with the South Rift Association of Land Owners (SORALO), on land which belonged to the Reto Women's Group. The fees that paying researchers and other guests are charged include a maintenance fee to cover running costs, managed by SORALO. The remainder of their fees are kept in a bank account managed by Reto Women's Group.

of tourists pay to stay and use the facilities, and where they occasionally sell handicrafts. As one member noted: "that is our project, it is a blessing to us ... sometimes we sell a lot and come home with more than KSh 10,000. The biggest benefit we have got, as the women of Olkiramatian, is the resource centre" (I32). The Kileken Women's Group is the most prominent group in Shompole. They run a small guest house in Oloika town[30], where I also stayed, which is not as profitable as Lale'enok, but does earn some money for its members (I29).

There is no financial incentive to be part of the aforementioned women's location-based committees, and so they have to be "women who are able, and have the heart to find a way" (I20). This immediately limits participation and favours elite women (Cornwall, 2003) who do not necessarily represent the priorities of poorer, or more marginalised women. Furthermore, women who hold these positions are ostensibly recognised as leaders, but are often not invited into community leadership discussions dominated by men. One woman leader shared her honest view: "I can't lie, I don't know of a woman leader who was invited to sit with the [men] leaders. Men are oppressing us, because we should sit there" (I29). Even when women leaders do partake in larger discussions, they feel they are only listened to when they have good things to say: "the thing that we cannot speak about, is corruption. But if we talk about the good things, nothing is said against us, and people agree with us" (I29; Cornwall, 2003). These findings are unfortunately commonplace in research on gender and participation in governance in a development context where women are often regarded as a homogenous group who can be represented by any woman, or even when offered a voice, they are unlikely to be heard (Archambault, 2016; Cornwall, 2003; Goldman and Little, 2015; Homewood et al., 2020). Although research of Maasai in Tanzania suggests that the empowerment of women is happening (Goldman and Little, 2015), and research of Maasai in Kenya suggests that women are more readily recognised as central to resource governance and access (Archambault, 2016), these gendered impacts still deserve greater research attention.

5.4 Hierarchy, working together, and bricolage

The thousands of registered members of the GRs are clear that "they own this land" (I7, R48; Figure 4.6), and so ultimately, it seems that the elected GR Management Committee, who are legally holding the land and assets of the GR on behalf of all the

[30]The Kileken Guest House was also funded by the African Conservation Centre.

members[31], are given significant authority (Rutten, 1992). For instance, in any land disputes involving the GR Management Committee and the administrative chiefs, the latter backs down (I5, R48). In other settings, such as the enforcement of a government directive, or discussions about development projects, the administrative chiefs hold great authority: "it is clear even how they [administrative chiefs] introduce themselves, you sense the hierarchy very clearly, and you can't proceed if the [administrative] chief isn't there"[32] (I43). The GR Management Committee and the administrative chiefs, can ultimately determine if any idea is accepted or not, and can even sabotage ideas that might undermine them, or their roles (for instance see Chapter 4.8).

Yet, as I have already alluded to, these institutions of governance constantly collaborate. For instance, the elected Management Committee see themselves as "in charge of the whole Group Ranch" (I23), but they also understand that ultimately, they cannot make decisions without other leaders: "I myself cannot make my own decision unless I consult all the leaders, I have to consult them and we pass it together" (I23). Also: "we [Management Committee] are the ones in charge of the land, the chiefs [*nkraoni* and *ilaiguenak*] have no responsibility for land, they are in charge of people ... but we do not work on our own, we must all move together" (I7). They see collaboration as a way to solve problems that are either beyond their capabilities, or outside what they perceive to be their remit: "when I'm not in a position to handle a matter, I collaborate with others, if it's a dispute, if it's about resource sharing, if it's about an age-group issue ..." (I27). In Olkiramatian's constitution, they have a defined leadership forum (see Leadership Forum in Table 5.1), and current Management Committee members therefore say "of course I will work with them [other leaders] and I like to work with them, but even if I don't like it, the constitution requires me to work with them" (I33).

Representatives from the various governance institutions recognise their collective strength; as an *olaiguenani* pointed out "we join together so we can assist one another" (I18); a Subcommittee member: "we assist one another a lot" (I11); an administrative chief: "if any leaders are left behind, it is not good ... nobody will succeed by themselves, there is only unity so that we can move forward" (I30). For an illustrative example, when the administrative chiefs are given money from the County Development Fund for local development projects, "we [administrative chiefs] announce to the GR Management

[31]This has continued over into the Community Land Act 2016, see Part 3, Section 15, Functions and powers of the Community Land Management Committee (Government of Kenya, 2016)

[32]This is different to some other places in Kenya where administrative chiefs only play a small role (I43).

Committee, that we will have a meeting ... we tell them this is how much money we have, and we want to use the money in this way. The GR representatives might say let's not use it this way, let's use it that way ... " (I30). Collaborating was also mentioned as a way of monitoring each other so that, as a GR Management Committee member put it, "no one can pull the rope too far their way [*sensu* people can't take advantage]" (I3).

Although the arrangements between the different institutions of governance might seem complicated (Figure 5.1), the local leaders see them as sensible. People recognise the strengths of the different institutions: "each is different, the Group Ranch, the *olaiguenani*, *nkraoni*, the MCA, all of them are different, each one has their own worth" (I13, also I33). Each institution recognises that they have their own sphere of influence "every department deals with their own work, but all of them sit together ... if the work is about livestock, it will be for us the *ilaiguenak loonkishu*, if it is related to the government, it is for the *nkraoni* [administrative chiefs], if it is about that area [pointing to the conservation area] it is for those who are responsible for that area. We all respect each other" (I18). For instance, one former elected official recounted how "if you make a mistake, and your *olaiguenani* calls a meeting of your age-group, they can 'jump' on you, even if the government is there. They can do anything to you" (I13). However, the *ilaiguenak* themselves pointed out that they too occasionally require the help of other leaders, like the administrative chiefs, when dealing with "ignorant"[33] people (I18). They rely on each other.

The ways in which these institutions of governance work together reveals the plurality of each of these institutions, and the ways in which they draw from their different resources of authority when collaborating, or displaying authority, in messy and contested ways. What emerges are new forms of governance which are neither traditional, or modern, nor formal or informal, but something else.

5.4.1 Bricolage of governance institutions

In the South Rift, these new forms of governance are dynamic, polycentric hybrids of the modern and traditional, the formal and informal, where institutions form a mosaic of interconnected arrangements (Andersson and Ostrom, 2008) to monitor each other, and no single agent possesses all the capabilities to address multi-faceted and complex environmental problems (Lemos and Agrawal, 2006). Although the ways

[33]This is commonly used to refer to people who are considered to selfish or stubborn.

in which the various institutions work together might be described as governance hybrids, they are also usefully understood as a bricolage, a process that Upton (2004) adopted when studying institutions in Mongolia's pastoral commons. Upton (2004:234) describes bricolage as: "a conscious or unconscious process of drawing on or 'piecing together' existing institutions, norms, mechanisms, relationships and power structures in support of new institutions forms." The French *bricolage* is to make resourceful use of what is at hand, and as well elaborated by Cleaver (2012), institutional bricolage is a useful analogy for the ways in which various institutional arrangements are made to work. This process is legitimised by "reference to tradition, socially acceptable ways of doing things, and existing relations of authority" (Cleaver et al., 2013:168).

For instance, as I have described above, although the governance institutions of the past are waning in influence, they have not completely dissolved, and the powerful institutions like the GR have not engulfed all authority. Instead, together, they are a reflection of the complexity of modernity embedded in social history; a governance which combines moral economy, local practises, and formal institutions (Cleaver et al., 2013; Hydén, 2006). That is not to be dismissive of what worked previously, as just described, but rather, that "current governance frameworks reflect the current reality ... because the circumstances are not all traditional anymore" (I43). So whereas Berkes et al. (2000) claim that often, there needs be a rediscovery of traditional systems of knowledge and management, here, the traditional systems were never lost for them to be rediscovered. Instead, through a process of bricolage, traditions have now been incorporated into the current configuration of governance institutions, which is better suited to the changing regional and national contexts. In effect, drawing on both traditional and modern actions, rights, and authority, lends legitimacy to this governance configuration.

5.5 Modalities of governance

The aforementioned governance institutions and the ways in which they work together are put into practice through meetings and negotiations. Some meetings involve all of the local leaders (shown in Figure 5.1 as the "Group Ranch Sphere"), some meetings only involve a few. For example, when deciding what to do about a local development project, "we call a meeting, whereby there is the Chairman of the Group Ranch and other leaders like the *nkraoni* [administrative chiefs], *olaiguenani*, elders, and area representatives. We discuss what we see is not doing well, and where we need to support, and we try to assist the projects that we see are struggling" (I11, also

I22, I30, I38; "Group Ranch Sphere" in Figure 5.1). Or, for instance, when a company approached the GR, to inquire about setting up a solar mini-grid business, but many of the leaders were not available at short notice, "we went to the meeting with two representatives of the Group Ranch [Management] Committee, two representatives from the Conservation [Sub]committee, two representatives of the *nkraoni* [administrative chiefs]" (I33). Other meetings might be called to resolve intra-community conflicts between people where "traditional mechanisms of dispute resolution in which often, elders [*ilaiguenak*] are used as mediators to bring both parties to the table and have a discussion" (I36, R48).

A strength of adopting a bricolage approach to governance is that the flow of communication both in and out of these meetings is facilitated by the fact that each leadership group includes people from within the community, representing various different geographic areas. As previously mentioned, the elected GR Management Committee includes one member from each sub-location; the assistant administrative chiefs are from each sub-location, with an administrative chief from each location; the *ilaiguenak* are from different areas within the GR boundaries, but also have a regional senior *ilaiguenak* (Figure 5.1). Many community members are keen to know the outcomes of discussions, as one interviewee (I38) points out, "everybody wants to know what is going on in the leadership." The high voter turnout[34] in the GR elections (Figure 5.3) also confirms that they are aware they play a significant role in determining who represents them.

Other meetings are to open up discussions with people at a local level. For instance, I would regularly witness small but well attended public meetings (called *barazas*), which were supposedly held at least twice a month (I30, I38), convened at the sub-location level. At these meetings the leaders, "tell people what is going on, and for example if a big decision was made by the Group Ranch [Management] Committee ... we tell them this is what we are doing, so that we can go together" (I30). Not everyone is necessarily present at these meetings, but those who were not present access the information through social networks, as they say: "people will say 'when did they say that?', and so they will hear from the people who did go to the *baraza* [public meeting]" (I38). The regularity of the meetings likely reinforces authority, and maintains strong social capital, which, when unused, deteriorates rapidly (Brondizio et al., 2009).

[34]Note that this is only from those who have a vote, i.e. members of the GR.

When decisions are of greater significance to all the GR members, they are left to the GR annual general meeting[35], where the issues are announced, and discussed, to a quorum of the registered members who were present (see Meetings in Table 5.1; I27, I38). Those who are present, are all given a say[36], as one female leader describes "general meetings ... join all the people in the community, including women, to attend. They all have to give ideas when it matters. I can talk as a Chairlady, but also the other women have a say, and a right to speak during these meetings. If they see something is going astray, they have a right to say 'can we stop this, let's not do this, because it is not helpful or right for us to do', even though they are not leaders" (I20). However, when pushed on how practical it is to achieve a quorum (according to the constitutions, 2/3 of registered members), leaders claim that after good rains "you will easily meet the quorum" (I27), but that trying to achieve a quorum during difficult times, like a drought, rarely happens, as often people are busy with their livelihood activities (I27, I33).

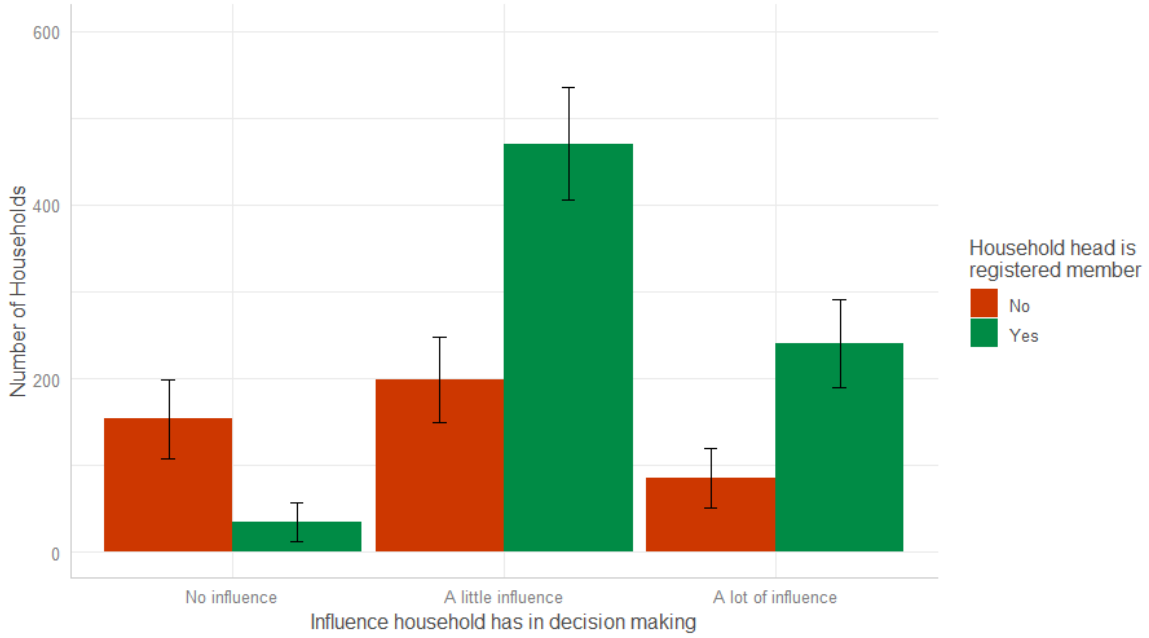
During my fieldwork, both Olkiramatian and Shompole called annual general meetings. In Olkiramatian, I heard that one general meeting was called to finally establish if their new Constitution would be accepted (R48). I then subsequently attended their next general meeting to elect their new Management Committee (Figure 5.2). In Shompole I heard that at their annual general meeting they signed an agreement with an external lodge operator to build a small private facility (R48). Significantly, with regards to the effectiveness of these modes of participation, Figure 5.4 shows that the majority of households in both GRs with a registered member as head of the household, feel that their household has some influence in decision making in their GR. Even when including both registered and unregistered household heads in Olkiramatian and Shompole, 83.3% [95% CI: 79.2 - 87.6] and 78.3% [95% CI: 74.0 - 82.7] respectively, of households still feel they have some influence in decision making in their GR.

This entire decision-making process is succinctly described by one GR Chairperson with regards to their ongoing process of seeking a new eco-tourism lodge operator:

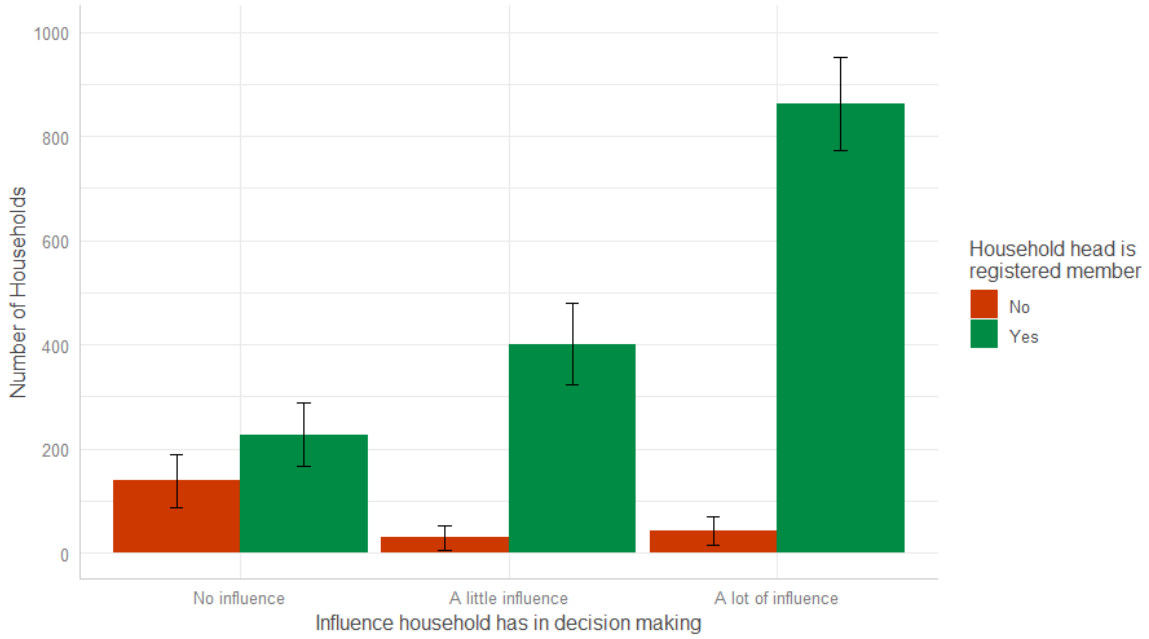
> "I ... go and talk to an investor [lodge operator] on my own, if I have talked with them well, then I will go to my Group Ranch [Management] Committee, and we will sit down and understand each other. When we

[35]Or the "Special General Meeting" in Table 5.1, although I am not aware of when these were ever called.

[36]The Shompole constitution sets out that all members are "entitled to attend, to speak and to be heard, and to vote at all general meetings" (SORALO/2011/1).



(a) Olkiramatian



(b) Shompole

Figure 5.4 Household survey responses to: "How much influence do you feel this household has in decision making in the Group Ranch?" for a) Olkiramatian, and b) Shompole (two people said they don't know). Error bars denote 95% confidence intervals.

> understand each other, we have a leaders' meeting. If we all agree there, then the final decision goes to a ... general meeting, with all the Group Ranch members. We tell them [Group Ranch members] a b c d, if they understand, they say 'okay, go on,' then it is passed. If they disagree, then we have to go back. I can't pass it on my own" (I23).

These constant meetings, small and large, with discussions and negotiations, appear to be an effective approach to dealing with thorny issues, such as inviting in an eco-tourism lodge operator. Some leaders claim that this bricolage approach to governance described above, which is now captured in both GR constitutions, wasn't always the case, but has emerged as a result of learning from the challenges of the past "the fact is we have experience of the past, when people ignore just the *nkraoni* [administrative chiefs], or the general community agreement, and do their own things, and when we did that we all fell down" (I30, also I23, I27).

I will now discuss how the aforementioned institutions of governance and the modalities they use, are operationalised, by examining processes of adaptive governance.

5.6 Adaptive governance

As previously mentioned, adaptive governance can be understood as that which has the potential to mediate complexity in social-ecological systems through trial and error (Chaffin et al., 2014; Folke et al., 2002). As one Management Committee member put it: "the things that bring problems are there, which means that you might plan things one way, but things can come in and change your plans" (I3). Then, when there are problems: "any problems that we see, we deal with" (I39).

During my field research I witnessed and heard of numerous examples of adaptive governance processes at work. Moments of crisis, or critical juncture (Green, 2016) in natural resource management, such as a drought, can reveal how (or even whether), institutions of governance provide a response (Davies et al., 2015). I will try to capture these processes, from a GR perspective, through four brief empirical examples which illustrate how the governance institutions in Olkiramatian and Shompole demonstrated adaptive governance. These examples will reveal how the boundaries between the formal and informal, the traditional and the modern, are messy and permeable. They also demonstrate that the process of institutional bricolage goes beyond being serendipitous solutions when adapting to change. Rather, they are deliberate ways to use the

strengths of each institution to reorganise, through socially justifiable norms.

5.7 Adaptive governance: seasonal opening and closing of settlements in the conservation areas

Livestock owners in both Olkiramatian and Shompole seasonally migrate their livestock to dry season grazing refuges. There are several of these across the landscape, such as Endoinyio Lasho, Ntokotani, Lendorog in Shompole, and Oldorko, Ole Taga in Olkiramatian (I20, R48; Figure 3.3). However, the largest dry season reserves for both Olkiramatian and Shompole, are their conservation areas, west of the Ewaso Nyiro River (See "Zonation of Land" in Table 5.1). Opening or closing settlement along the west side of the Ewaso Nyiro River is generally contingent on the state of grazing resources inside and outside the conservation area, although there is flexibility in how this is interpreted. The process of only allowing seasonal occupation of settlements is only one part of an escalating series of measures to cope with spatial and temporal rangeland variability. This begins with a fundamental system of having settlements away from where the best grazing is found: "we live here and the livestock go and eat the grass and then they come back" (I39; Figure 2.2 - the random sampling of households shows how settlements in the grazing areas are organised in an approximate north south arrangement. Settlements in the conservation area are only permitted close to the Ewaso Nyiro River in a north south arrangement, other than in exceptional circumstances).

Rangeland management of this kind takes places in each settlement area, through discussions and deliberations between the herd owners and *ilpayiani* of each area, together with the GR Management Committee (I7). The process is described by the vice-Chairperson of the GR as follows:

> "we go and sit with the elders of that village [Oloisinyai], we agree on the watering points along the river ... we go and we sit with the elders from that [Mbirika] village, we agree that the grazing area of Mokoko should not be used by sheep and goats, and that cows should come to the southern side of Olkiramatian. The Management Committee proceed onto Oldorko [village], and we say that Ole Taga [grazing reserve] will not be open for grazing until the 1st day of the 9^{th} month ... so that is how we follow our plan" (I7).

As the dry season progresses many people described in detail (I2, I3, I7, I11, I20, I22, I30, I39; also in Western, 2018[37]) how settlement is eventually allowed near the dry season grazing reserves, such as the conservation area: "when it is around the 9th month, we go to the place near the river. The cows go into the conservation [area], to eat the grass, and then go back, until it rains" (I39).

As the quote suggests, there are generally accepted times (around September in most years) for settlement to be permitted near the dry season grazing areas. However, this is flexible, and deliberations about whether this is too early or too late begin as soon as herd owners see a shortage or abundance of pasture in the areas they occupy in the wet season and early dry season. The herd owners catalyse this process, as a leader from Shompole describes: "it is the noise of the community which goes up to the [Group Ranch] Chairman and the chiefs [*ilaiguenak* and administrative], then they call their meetings" (I22). The "noise" doesn't just simply result in a decision, but instead, there are further deliberations, and advice is sought from others, like the Conservation Subcommittee, the scouts who patrol the conservation area and other lands in the GR, and the local researchers who monitor rangeland condition.

This process is described by a member of Olkiramatian's Conservation Subcommittee:

> "we advise them [Group Ranch Management Committee], because the conservation has researchers who go into the bush, and there are also scouts who go into the bush. So they know when the drought[38] has become bad. If the people of Oldorko [village] say they want to move, and the rangers or the researchers say that it is not true because there is still grass in a particular place, then conservation [committee] helps to advise the Group Ranch committee to say you should not allow a move at a certain time, because Oldorko [village] still has grass in a certain place, or Ole Taga [grazing reserve] still has grass, it is just water that they need, there are things like that" (I3).

This scouting process is only a modern twist on the Maasai practice of using *eleenore*, as described by Ole Mpaayei, writing in 1954 (p60): "when Maasai wish to migrate, they send scouts ["*eleenore*"] to first see the land. When they return ... they tell you how much grass and water there is."

[37]Western (2018) describes this process of deliberation as it relates to pasture and the presence of lions and other carnivores.

[38]This is in the sense of dry season.

5.7 Adaptive governance: seasonal opening and closing of settlements in the conservation areas

Once a decision is made by the GR Management Committee, the administrative chiefs and the *ilaiguenak*, they inform herd owners across the various geographic areas: "the Chairman of the Group Ranch calls a meeting ... in each sub-location ... they say on such a date there will be a meeting so that we will allow people to cross ... everybody goes together" (I22, also I36). This process is summed up by the *olaiguenani* of the Irkishili age-set:

> "the chairman tells us all, the *ilaiguenak*, the *nkraoni* [administrative chiefs], he tells us that he wants a meeting, so we set a date, and we all sit together. We proceed through that meeting, and when we are finished ... I tell my herders, another elder tells his herders, we have passed this: 'cows must not cross the water until a certain date.' That is how we pass on that report" (I6).

The informal rules are clear that without this process, settlement in the conservation area will not be sanctioned. Furthermore, as explored in Chapter 4.8, the process of only temporarily occupying these areas as grazing refuges predates and supersedes the introduction of the conservation areas:

> "we came together and we held a meeting, as people from this area, and we decided ... no livestock should be in the conservation area, until we have had a meeting. None. Even if we don't have any wild animals or conservation, or lodge, there will be no livestock that will step into the conservation area ... until we get together and we agree" (I30).

A Conservation Subcommittee member claimed that those who break these rules are not treated lightly:

> "in the past and even now, if we agree that we were to move into the conservation in the 8^{th} month and if you move into the conservation in the 7^{th} month, on that same day, people would come to move you back out straight away, and they would slaughter your biggest cow ... or you would be fined KSh 20,000 [approx. US $200], so that you feel the pain, and see that it is not only you who loves cows" (I3).

5.8 Adaptive governance: closing settlements in Olorishi

Whereas the decision about when to allow access to grazing in the conservation area is seasonal, the next example demonstrates adaptive governance in response to what was perceived to be a small crisis. This case demonstrates how areas which have semi-permanent settlement, can then be closed off. To demonstrate that these changes were the result of adaptive governance, and not simply happenstantial changes to an existing settlement pattern, it is also important to understand why there was a change.

In late 2014 and early 2015, there was less precipitation than in previous years, although this negative precipitation anomaly is not unusual (precipitation anomalies are shown in Appendix A.1 and A.3). However, this period came at the end of a prolonged period with a negative EVI (Enhanced Vegetation Index) anomaly (EVI anomalies are shown in Appendix A.2 and A.3). In response to the reduced availability of vegetation, including in the dry season grazing reserves, many herd owners from Shompole followed a usual migration pattern, and went to Tanzania where some vegetation remained.

The ensuing events were retold to me several times, but are best captured through this version (I30):

> "at Engare Sero [in Tanzania] we were challenged by immigration officers. They said 'we don't want your cows, so for each cow there will be a 1,000 Kenyan Shilling fine ... and the cows cannot graze here without that.' So some people paid. But we tried to negotiate with them, but the immigration officer was very, very rude, he told us 'You know, I am a Luo born in Kenya, but when I was young I became a Tanzanian. I have only chickens, and if there was a drought that was to affect me, and I was to bring my chickens to your house, you would strangle[39] me,' and everyone laughed. So then an elder [from Kenya] said 'you know you and us we help each other, your cows eat on our side, and now we have come this side.' He [immigration officer] said 'I don't stand here as a Maasai, I stand here as an immigration officer of the government of Tanzania' ... and he had brought out a full bag of handcuffs, and he said 'I have handcuffs for all of you.' That meeting was very tough, because they [the Tanzanian Maasai] even have a very strong council of elders, and they stood up and said 'no, this is wrong,' the

[39]He used the word "*kunyonga*."

> *ilpayiani* and the *ilaiguenak*, they said 'this is a bad thing' [to send the Maasai back to Kenya] ... aaaiiiii, but we left there, just like that."

So when the herd owners came back to Shompole, they realised "God had worked through this person [immigration officer], and helped us to focus and see that we were ruining our own areas" (I30). As a result of their settlement patterns at the time, "when there were rains, people stayed living in Kikuro ... and Olorishi" (I38) which are both settlement areas near important dry season reserves, and they realised that "if we stay living there [Kikuro and Olorishi], the cows go in ... too soon" (I39). The crisis led to a governance response, and they decided that something had to be done: "we all got together and sat down. We said 'if we close that side during the rain, and we just grazed on this side, we wouldn't suffer like that' " (I38).

As noted previously, with any major decision on settlement, the proposed decision to close these areas brought together all the leaders of the community: "all the formal and informal leaders, that is *ilpayiani*, *ilaiguenak*, from all the age-sets came, all the *nkraoni* [administrative] chiefs, together with all their assistants were there, up to the MCA ... and they discussed the facts" (I30). They decided "to close those *emanyatas* (*sic*)[40] because they were why we were finishing our grass quickly, everybody had to move ... so we closed those settlements" (I30). This meeting was followed by several other meetings across the different geographic areas "you start here and you hold a meeting, then you go to Oloika [village], you hold a meeting, and then you go to Shompole [village], we say the same thing, we go to Pakaase [village], so you rotate, everywhere" (I39). In this way, "the people will know: 'this is what we decided, and we all agreed about Olorishi' " (I26).

In total, 86 *enkangs* in several neighbouring settlement areas, were closed and moved: 75 in the areas of Olorishi, Orngarua and Kikuru; two in Naijotir; nine in Oldepe (I20, I26, I27, I30, I38, I39, R48; also Western, 2018[41]).

In this particular example, their chastening experience in Tanzania taught them that others "didn't want to know about our suffering, they just chased us and told us to go back ... so that was when we came back, sat down, discussed and said, we have to figure out how we are going to manage our grazing, because if we don't manage our grazing, we will suffer" (I38). As another elder emphasised about this situation "this experience taught us, there is a Maasai saying 'something that isn't difficult, has no

[40]Settlements. Normally, *emanyata* is singular and *imanyat* is plural, according to Mol (1996).

[41]It is clear that the principal reason for closing settlements in that area is because of pasture, water, and disease although the presence of dangerous wild animals is also mentioned (Western, 2018).

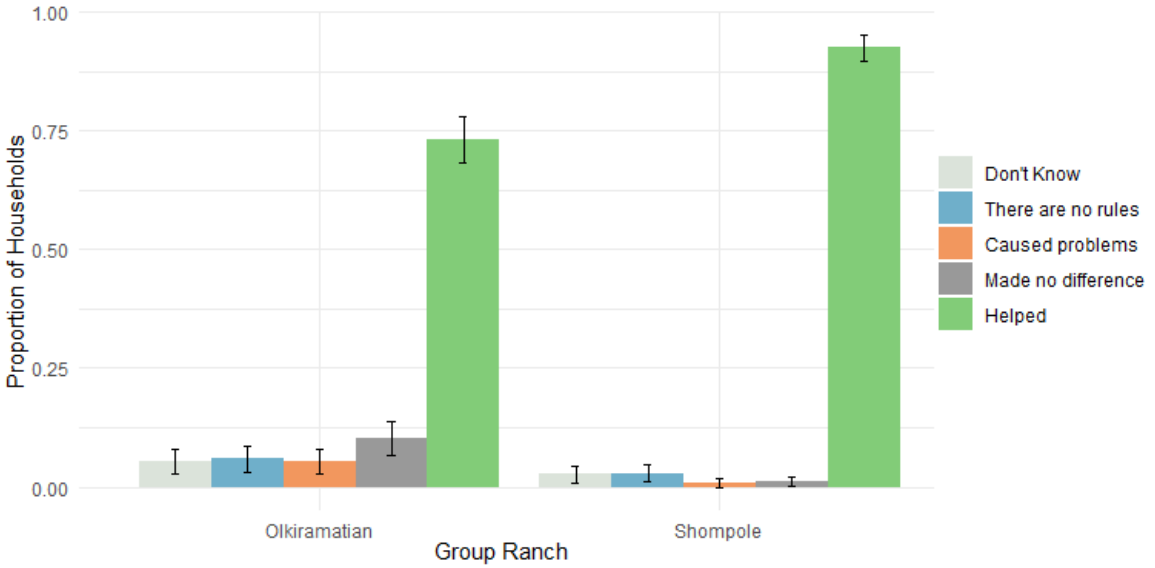
lesson with it' " (I26, also I17). Up to the end of my time in the field, these rules had not changed, it is "only during a drought that the cows can go there to that side, but people cannot live in Olorishi" (I39), and "even in this last drought, people didn't go to Tanzania" (I30).

It would be remiss, however, not to mention that although this is a well elaborated example where access to grazing in Tanzania was denied, and suggests that these reciprocal systems are breaking down during the last five years, Olkiramatian and Shompole have granted permission to livestock herders from Tanzania, and from the neighbouring *iloshon* access to their late dry season grazing in their conservation areas (I36, R48), contingent on lengthy discussions and negotiations, recognising that at some point in the future, due to spatial and temporal variability in vegetation, they will need to rely on lands outside of theirs for their livelihoods. As described elsewhere (Berkes and Folke, 1998), these systems of macro mobility are about inclusion, where predictions of future variability mean that access to resources in other lands are granted through negotiations, and reciprocal agreements. Based on my research experience, it appears that although there are ongoing attempts to alter this, Maasai continue to rely on their clan and age-set connections for this larger scale mobility (Goldman, 2006) which transcends nation state and GR governance.

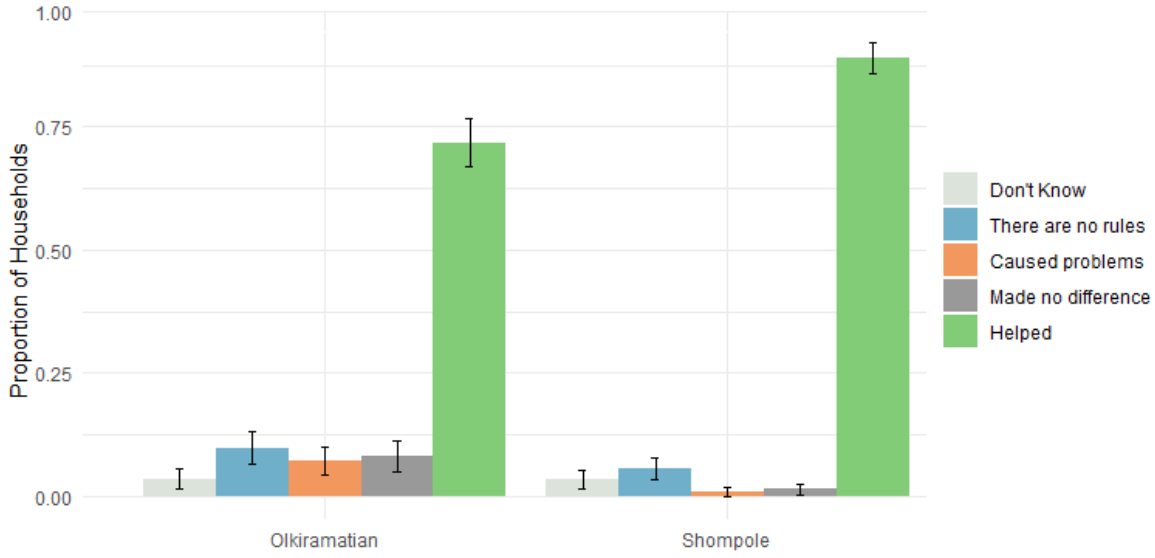
Figure 5.5a shows that the vast majority of households in Shompole (and Olkiramatian) say that the rules about settlement are helpful. However, I did hear that a small number of people initially disagreed with the decision to close settlements in Olorishi. The leaders I interviewed were stern when discussing people who went against the new settlement rules: "if there is someone who doesn't agree, we will fine them, money, like KSh 10,000 or we will take a cow, a very big cow" (I39), and "if you have refused to move, we will take five cows, and give them to the Group Ranch ... when you are punished like that, you will know to not do that thing again [laughing]" (I26). There is clearly little consistency in these sanctions, and they are not those set out in their constitution, but they imply that once there is consensus, sanctions are made based on the severity of the rule-breaking.

5.9 Adaptive governance: rules about grazing

These first two empirical examples demonstrate adaptive governance in rules about settlement, one about seasonal changes to settlement, the other a more permanent change in settlement patterns in response to a crisis. As was the case for settlement,



(a) "For your household, the Group Ranch rules about where people can settle have..."



(b) "For your household, the Group Ranch's grazing management rules about dry season grazing reserves have..."

Figure 5.5 Household survey responses when asked about dry season grazing management and settlement rules." Error bars denote 95% confidence intervals.

the results from the household survey in Figure 5.5b show that the vast majority of household heads in both Olkiramatian and Shompole feel that rules about grazing are helpful. I will now give two final empirical examples of adaptive governance as it relates to grazing, one from Shompole, and one from Olkiramatian. Both of these rules were brought in during my field work period.

In Shompole, in 2017, the GR Management Committee, the *ilaiguenak* and *nkraoni* chiefs, together with the herd owners who use the area, decided to close grazing access to Orng'arua, a part of the Ewaso Nyiro swamp, to sheep and goats:

> "Last year [2017] ... it was said Orng'arua will not be grazed [by sheep and goat] ... anyone who enters, it was agreed that they would be fined KSh 20,000... if you don't have KSh 20,000 then they will take livestock to that value. You will not be asked, it will just happen" (I18, also I40, I41).

Preventing only grazing by sheep and goat was justified as follows:

> "you know sheep, and cows, they don't eat grass the same way. Cows eat a lot of grass, if a drought comes, sheep can survive by eating just small bits of grass which cows can't eat. So we passed that rule that this swamp [Orng'arua] is for the cows from this time to this time. The sheep can go and eat on that [other] side ... when they don't have any grass on that other side, that is when the sheep can go in there" (I23)[42].

After this new rule was implemented, I heard that one person was fined for breaking it, and consequently had three sheep and goats slaughtered, with the meat and fat shared among the other herd owners (I40).

In Olkiramatian, in 2018, the leadership forum (See "Leadership Forum" in Table 5.1), after meetings with the registered members who lived in Nguruman[43], decided to close (almost) all grazing access to cows, sheep and goats, in the Nguruman area. Figure 5.6 shows one of the posters placed on many shop walls in the main town centres in Nguruman, which announced the rule change. As the posters state, all herd owners were given seven days' notice to move their livestock out of Nguruman, before the 7th of May, 2018, except for five goats (and sheep), or two cows, which could be kept for

[42]This same story was initially recounted to me by another friend who was describing someone who was actually fined for breaking this rule (R48).

[43]Many people who are not registered members live in Nguruman, and from my information, they were not part of these discussions (see Figure 5.4a).

milking. Those who broke the rules were subject to fines of KSh 10,000 for goats (and sheep), and KSh 20,000 for cows. One day in May, as I helped to push a broken down pick-up truck, loaded with livestock, I talked to the livestock owner and heard that he was rushing to move his livestock out of Nguruman, as he had just been fined KSh 10,000 for disregarding the new rules (R48).

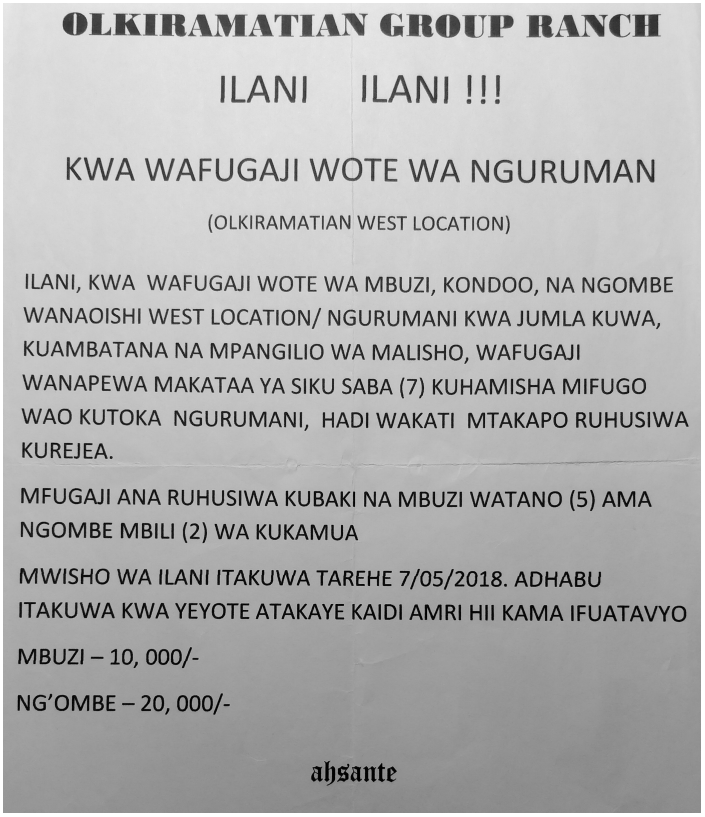


Figure 5.6 A poster placed throughout Nguruman, to announce a decision by the leadership forum, that goats, sheep, and cows were to be removed from Nguruman, before the 7th of May 2018. Those failing to do so were subject to fines of KSh 10,000 for goats (and sheep), and KSh 20,000 for cows. Picture by Peadar Brehony.

5.10 Rule sanctioning, rule breaking, and the moral economy

These empirical examples of adaptive governance also illustrate that the process of decision making is also tied to sanctioning of those who break the rules, usually in a graduated manner (Ostrom, 1990). The aforementioned examples revealed that although in this context *de jure* rules and punishments exist (see "Penalties and

Sanctions" in Table 5.1), often in reality, the moral economy, social capital, and *de facto* sanctioning are still crucial.

This bricolage of the traditional and modern, and the graduation of sanctions are captured in the following story, from an *olaiguenani* (I6), about what would happen to a particularly stubborn individual when a settlement area is closed:

> "[We would say] 'You! This is not right. Move. Because, we have agreed and you have not followed.' So that is how we manage those people so that they don't break the rules. [if they still don't move] we are called with the *ilpayiani* to solve it ... we go straight for the cows of that *enkang'*, and ... they are brought back from grazing, and they are driven back into that *enkang'*. The ladies are told to pack up and move ... it is members of the community who have agreed that we should move, it is not just you who is from the community. You tell us, you won't move, or you will move. If he still says I won't move, you close the *enkang'* and it is cursed ... if the cows are not finished [by the curse], a child will die. If that person is wise, he will accept what was said by the community, and will follow. Secondly, if they still stay, we call the Chairman [of the GR] ... the Chairman will tell the chiefs, and police are brought. The person will be arrested, and then the cows will be moved when the elder is taken away ... and he will be fined a big steer."

Some also talked about other different forms of bricolage, like starting this process by first "giving you a written letter. If you disagree, then we will send the elders [*ilpayiani* and *ilaiguenak*]" who will then take a steer "because you have broken the rules. If you don't give that steer, you will be cursed, you and your children"[44] (I7, also I22, I30, I38). Some also talked of resorting to forcing people to move by "getting a car [to move you and your belongings], and it is you who will pay for it" (I7), a process which I heard happened in Shompole when they closed a settlement area, and three households who attempted to go back were forcefully moved in cars[45].

[44] I was given the example of an individual in Shompole who grazed livestock in an area which was a well-known set-aside for calves (*olopololi*), so he was cursed, and his son broke his leg (I7).

[45] This instance involved KWS: "three people went back and settled there [where they were banned] ... so we called KWS, we told them ... don't even move them during the day, go at night ... no one will ask you anything because the community have agreed, that person has gone against the whole community" and they were put into the KWS vehicles and moved during the night. The source is kept anonymous for ethical reasons.

Similar accounts of graduated sanctions, incorporating both the traditional and modern, are retold by many of the current leaders who were interviewed (e.g. I22, I33, I38), and they joked that those who end up being sanctioned "are the people who are then the sharpest at following those rules ... they pray that someone else will [break the rules] so that they can do it to them" (I38).

Furthermore, as in other well documented cases of local natural resource governance (e.g. Neumann, 1998; Humphries, 2012), there are often tensions between those breaking rules, and those sanctioning. For instance, NGOs involved in conservation noted that "there shouldn't be any hunting of wild animals, [but] there is still small-scale bush-meat hunting" (I36). During the course of field work I experienced "classic" cases of moral economy, where local community scouts were aware that a member of their community was responsible for the illegal act of killing a Burchell's zebra (*Equus quagga*) or Grant's gazelle (*Nanger granti*). However, instead of reporting them to law enforcement, the scouts would let them know that they were aware of their activities and advise them to stop (I11, R48).

This kind of humility and flexibility is also found in members of the Conservation Subcommittee (I11):

> "if I met this person [who has illegally killed a wild animal], I would explain to them: 'This is bad. The community has sat down and created a Conservation Area, and we get money from the Conservation. Even your family are getting something.' That is a better way to explain, instead of just having them arrested, for me that doesn't help. If you try to tell someone who doesn't have any food: 'Don't go out hunting wild animals!', and you are unable to give them food, how do you expect them to stay as a human being? ... Instead, if there is even a little casual job, they will be considered ... and then tell them: 'This money is not from selling a goat, or a cow, it is from those wild animals that you want to kill!' "

I also encountered more extreme cases[46]. For instance, a registered member of one GR was arrested with elephant ivory in their possession, in another county. The individual was known to have killed elephants in the past, but was also from a well-known family. When the accused's family realised that even selling all their cows would be insufficient to pay for bail, they attempted to raise money elsewhere. They asked the GR Chairperson for financial support from the GR, but were refused. They

[46]Sources are kept anonymous for ethical reasons.

then asked the Chairperson of the Conservation Subcommittee (who, before the new constitution had their own bank account), and they were offered KSh 50,000 towards the payment of lawyers and bail. While this may appear antithetical to the goals of conservation, it makes sense when understood through the lens of a community with a strong moral economy reliant on social capital[47].

It should be clear that, although rules exist, together with graduated traditional and modern sanctioning, the bricolage of different forms of governance and sanctioning are also inherently flexible. In many ways these can be seen as important attributes of adaptive governance, but they can also be easily corruptible. Even when there is a bricolage of governance institutions, powerful stakeholders within this can put pressure on others to encourage one thing, or prevent another (see Chapter 4.8 for past examples of this).

5.11 Clans and politicking

Adaptive governance is inherently political (Nadasdy, 2007), and the one aspect of governance in the South Rift that came in for repeated opprobrium, was politics. One elder captures the sentiment of many: "the biggest change I see is politics ... [and] politics has brought in corruption" (I5). In the South Rift, political power wrangling appears to be intimately tied up with inter-clan, and inter age-set disputes. In traditional governance systems, authority rested with diffused *ilaiguenak* and *ilpayiani*, but now clans and age-sets are increasingly being politicised. As an elder *olaiguenani* elaborated:

> "we did not have lots of politics [in the past], where people say 'These people can't do these things because they are from this age set, or this thing because they are from that door [referring to clans]' ... it is bad because politics has split people, from the one community ... it is really bad." (I6).

This appears to be consistent with a more widespread, creeping politicisation, as the Kenyan state continues the substantial process of devolution, with the resultant copious number of elected officials. In Kenya, many politicians are accused of using ethnic ties to win votes, and this also appears to be the case in the South Rift where those standing for elected offices are beginning to use their clan and age-set affiliations

[47]The individual was found guilty and sentenced in April 2019, to pay a KSh 1 million fine or serve five years imprisonment.

and networks in the same way: you count how many voting members you have in your clan, and the power of your age-set, and you use that to get yourself elected[48] (I17). I heard several accounts of how these clan and age-set based politics played a part in the 2017 elections of the MCA, MP, and Kajiado Governor (I30, R48). The role that Maa clans can play in local politics was also found in Tanzania (Goldman, 2003).

In this sense, politics, and the divisions that they threaten to create, or amplify, could significantly reconfigure the existing systems of adaptive governance: "because politics is coming in, the management of the land does not follow the route that it should, because things are following the work of clanism instead. This brings problems, because people then only look after their own clans" (I3).

Yet here too, some leaders are incisively optimistic "politics has got very bad ... but we will solve that, we will solve that through discussions, and when we solve that, we won't have any other problems" (I39). Others acknowledge that it is in these cases that traditional leadership continues to play a unifying role (I18, I27, I39).

5.12 Conclusion

In this chapter, my aim was to unpack the governance of natural resources in Olkiramatian and Shompole. The most obvious finding has been that the local institutions of governance in the South Rift have not rejected their traditional governance and suddenly modernised. Instead, they have formed a dynamic bricolage. The different institutions of governance, including the traditional, modern, formal and informal, combine in ways that are at once considered legitimate and participatory, but also effective at adapting to maintain a desired and resilient social-ecological system. In their adaptive governance of shared natural resources, rules are changed, rapidly communicated, and sanctioned. Changes are accepted to a large extent due to the different forms of legitimacy afforded to various institutions of governance (Mitchell et al., 2015), and achieved through participation, social capital, and the moral economy (Herrera et al., 2014).

The solutions that these processes of adaptive governance present, are tailored to the peculiarities of these geographic spaces, their cultures, their histories, and their shared land (Brockington et al., 2018). In the words of an *olaiguenani*: "our land is one land, so we have to work together ... if each person has their own land, they can't

[48]Some allege, for instance, that an unpopular former MCA only won his seat because he was from the most populous clan of one well populated area (*Ilmokasen*).

agree to do something, they will just do what they want" (I18). Adaptive governance in this sense, as opposed to regulatory and output-based management, appears to be well suited to mediating the complexity and uncertainty in local social-ecological change, and in so doing, enhancing resilience and maintaining a desired state (Nelson et al., 2007).

Similar processes of incorporating and making sense of modern and formal governance processes have also been shown by Gardner (2016) and Nelson and Ole Makko (2005) about the ways in which people in parts of Loliondo in Tanzania turned modern state governance in the form of imposed villages into legitimate political entities capable of representing their traditional interests. Likewise, Wright (2017b) shows how the people of Longido in Tanzania have turned modern and formal Wildlife Management Areas into spaces which fit their traditional and informal pastoral governance ideals. In the empirical examples I discuss, I showed that here too, in processes of adaptive governance, the principal consideration is adapting the social-ecological system to sustainably manage common resources, particularly for livestock. Here, unlike in other rangelands with conservation areas in Kenya, the often externally driven land management to primarily conserve wild animals has not superseded local governance institutions (Cavanagh et al., 2020; Western et al., 2020).

The configuration of governance institutions shown in Figure 5.1 demonstrates the combination of polycentric, decentralised institutions, combined with links to central forms of governance. In effect, this creates a balance between those who are distant from the local social-ecological system and tend to be ignorant of, and insensitive to, local considerations, and those who are local and tend to be ignorant of linkages to larger systems or forces which impact the system (Brondizio et al., 2009). Furthermore, efficient local governance which uses specialised local knowledge, increases participation and legitimacy (Lemos and Agrawal, 2006). Vertical linkages allow local social-ecological systems to be linked, to some extent, into regional and national institutions. This can be positive when local institutions gain strength from these linkages, but can be negative when policies that flow down undermine local arrangements.

More importantly, it is also possible that local governance institutions can be co-opted by a more powerful institution, like a central government, to increase legitimacy and manage conflicts without truly devolving power (Ostrom et al., 2002), as has occurred with traditional pastoralist governance systems in the colonial era (Mwangi, 2007a). Although I have tried to show that currently, powerful interests like those

of eco-tourism lodge operators are not overrunning adaptive governance decisions, in Chapter 4.8 I showed how this had occurred in the past. This crisis did result in governance changes, and Shompole subsequently adopted a constitution for the first time, but that is not to say that it could not occur again.

Furthermore, as I examined the institutions, and processes of adaptive governance, I have tried, as much as possible, to scrutinise the accounts and results that I found cautiously, especially given that, in erratic rangelands, the governance is continually changing. The perceived success of adaptive governance based on negotiation, consensus, consent is in some ways a comfortable way to ease the tension between the good governance trilemma of participation, legitimacy and effectiveness (Folke et al., 2005) when managing complex social and ecological systems. However, this should not blind us to the reality that these institutions of authority also create power imbalances. The adaptive strengths of bricolage mean that governance is constantly changing and shifting. This can result in configurations of authority which are open to manipulation, or capture, and can also obscure the constantly changing ways in which inequality is reproduced (Cleaver et al., 2013). Indeed, I have noted that although adaptive governance can be useful for adapting to change, it is not a panacea, as it can also create, or maintain unequal opportunities (Cleaver et al., 2013; Ribot et al., 2006), which are most obviously seen in the limited participation of women.

Although from my own experience in the field, from the interviews I conducted, from discussions with local friends, and from the household surveys it seems that by and large, people were satisfied that there was only a small, as people saw it, justifiable misuse of the institutions of governance[49], as I found with issues of gender in particular, but also clans, these systems are contested and there are ongoing struggles for reconfigurations of power.

Finally, it is true that after the introduction of the Community Land Act 2016 (Government of Kenya, 2016), Olkiramatian and Shompole are no longer GRs. They will now have to register as "Community Land"[50]. However, the reality is that, aside from semantics, there has been very little change or action by communities or the government to comply with or enforce the Act (I1, I36), and very few people are even

[49]Leadership is seen as "carrying the burden of the community" (I32), and most leaders not given a salary for the work they do (administrative chiefs do receive a salary), so the attitude about dealing with money among leaders is "I receive it, and distribute it. If there is anything left, then that will be a little portion for me." The source is kept anonymous for ethical reasons.

[50]Legally, the "Community Land Act 2016" repealed the "Land (Group Representatives) Act Cap. 287" and the "Trust Lands Act Cap. 288."

aware of it (R48). It is possible that, across Kenya, this change in legal status could have a profound effect, with very different outcomes in different places, for example un-subdivided GRs in Kajiado, as compared to subdivided GRs in Narok, as compared to community land in Northern Kenya. In that sense, it remains unclear, even after my research in the South Rift, the extent to which norms and cultural values ingrained in the current constitution of governance institutions which is centred around the GR, will be carried over.

Next, in Chapter 6, I will explore the ways in which the social-ecological system in the South Rift has changed with the introduction of the conservation areas in Olkiramatian and Shompole. Understanding the historical context, and the bricolage of adaptive governance in the South Rift has provided important backdrops and understanding for how I will interpret the following findings.

Exploring the role conservation areas play in altering social-ecological resilience to drought in the South Rift

> *"Meeki lenkaina ilala lenyanak"* | "An elephant is never burdened by its tusks," *sensu* Maasai are not burdened by the wildlife they live with.
> — Kipury (1983:199)

6.1 Introduction

Seminal research on the social and ecological impacts of conservation in East African rangelands has emerged from systems which include formally protected areas such as Nairobi National Park, Amboseli National Park, Serengeti National Park, and Tarangire National Park (Carabine, 2014; Homewood et al., 2001, 2009c; Sachedina, 2008). The proliferation of conservancies in Kenya over the last 20 years (King et al., 2015) has also resulted in nuanced research of the impacts of conservancies in places like the Maasai Mara and Northern Kenya (Bedelian, 2014; Pas, 2018; Pellisa et al., 2018; Yurco, 2017).

The Maasai Mara conservancies consist of collectives of individually titled medium to small land holders joining together to form a conservancy, a process often driven by one or several tourism lodge operators who offer each land holder a sum of money as land rent, with varying levels of landholder participation in the management of the land (Bedelian, 2014; Butt, 2011; Cavanagh et al., 2020).

Exploring the role conservation areas play in altering social-ecological resilience to drought in the South Rift

In Northern Kenya, conservancies are found across a range of different forms of land tenure, from Group Ranches (GRs) or trust lands[1], to privately-owned large parcels of land (such as Lewa and Ol Pejeta). Several conservancies in Northern Kenya have partnered with the Northern Rangelands Trust[2], a Kenyan NGO that offers to assist communities, in exchange for what they call a "pro-active programme of improving the ecology within their respective areas" (NRT, 2007:8 in Glew et al., 2010). Indeed, Glew et al. (2010) found that in some conservancies who partnered with the Northern Rangelands Trust there were clear benefits at the household and community levels. However, strict rules about access and grazing have, in the words of Pas (2018:1) also created new "conditional processes of inclusion and exclusion."

Nevertheless, there is still much to learn and understand about how these relatively new forms of community conservation interact with social-ecological processes in Kenya. There are continued calls for particular attention to rangelands where wild animals, livestock, and people frequently overlap and share ecological resources (Yurco, 2017). In particular, there has been a lack of focus on how, given their spatial nature, the conservation areas affect social-ecological resilience to drought.

Although the conservation areas of Olkiramatian and Shompole were established almost two decades ago, there remains a paucity of information on the social and ecological outcomes of this process. In Chapter 3 I explored the changing context of community-based conservation in Kenya. Then in Chapter 4 I looked at how, why, and where conservation areas were introduced in Olkiramatian and Shompole. I established that the areas of the South Rift which are now conservation areas were already part of seasonal grazing management practices, as dry season grazing areas. The introduction of the conservation areas has not drastically altered these land use strategies. In Chapter 5, I unpacked how a mix of governance institutions link traditional and local processes with regional, national, and international ones through a process of bricolage, to legitimately and effectively manage the landscape and natural resources to maintain desirable and resilient social-ecological systems. In this chapter I focus on exploring how the presence of conservation areas in both Olkiramatian and Shompole have altered the social-ecological system and examine how this changed social-ecological resilience to drought.

[1]Communal land held in trust by local authorities/County councils under Kenya's Trust Land Act (Cap. 288).

[2]Northern Rangelands Trust were formed in 2004 and are based in the Lewa Wildlife Conservancy.

In particular, guided by my framework outlined in Chapter 1, I focus on understanding how changes to the relevant subsystems (namely the social system - governance; the social units - households; the ecological system - the South Rift area; and the ecological units of interest - vegetation and wild animals; see Figure 1.1) of the South Rift social-ecological system which includes community conservation areas have altered social-ecological resilience to drought. I aim to achieve this by answering the research questions set out in Chapter 1:

1. What long term changes to land cover have occurred, with particular attention to the dry season grazing refuges? How are these related to the presence of the conservation areas?
2. What long term changes have occurred to vegetation productivity, vegetation composition, and wild animal numbers? How are these related to the presence of the conservation areas?
3. In what ways do the interests of eco-tourism operators alter the management of the conservation areas?
4. How have the ways that household heads feel about the presence of the conservation areas and wild animals changed over time? How is this influenced by the wealth of the household?
5. Which households are most affected by human-wildlife conflict (HWC)?
6. How do the community conservation areas affect social-ecological resilience to drought?

Guided by this framework, I will then interpret my results in the context of what is happening in other parts of the social-ecological system, an essential step when trying to understand dynamic processes in these complex systems.

6.2 Chapter specific methods

Various methods used throughout the thesis have already been outlined in Chapter 2. I used additional methods specifically for this Chapter, including aerial photography and satellite remote sensing to examine multi-decadal land cover changes (Fox et al., 2003; Homewood et al., 2001; Lu et al., 2004). I also used recently developed analytical tools to look at how remotely sensed vegetation productivity has changed over time, and I used statistical tests to determine where there have been significant changes in vegetation productivity. Finally, I also used aerial count data of large wild animal

numbers to look at long term changes in my study area. These methods are described in this section.

6.2.1 Aerial photography

Whilst in Kenya, I was able to acquire the oldest aerial imagery available for my study area. This dated from 1961, and was lodged in the Republic of Kenya's Surveys of Kenya. These panchromatic aerial images were taken on the 15th October 1960 (five images), 8th of January 1961 (26 images) and 10th of January 1961 (two images), from an altitude of 30,000 feet, with a scale of 1:60,000. The steps I took to digitise the six-inch square film-based panchromatic aerial photographs so they could be analysed as land cover categories are shown in Figure 6.1. All steps were completed in ArcMap 10.4 (ESRI, 2018a).

6.2.2 Satellite-based remote sensing

Remote sensing offers many important advantages for the study of changes to land cover over time, including the ability to consistently measure both short and long-term changes (Pasquarella et al., 2016), or pinpoint late dry and drought season reserves (Western et al., 2015a). I used satellite-based remote sensing to examine changes in land cover, and vegetation productivity over time. I coupled these data with those from other methods, to examine how they might be linked with land use strategies (Fox et al., 2003).

Satellite derived land cover change

To observe long-term land cover change I used data from the Landsat satellites to perform a multi-temporal supervised classification, to create land cover maps (Wegmann et al., 2016). My spatial domain of interest was the study area whose boundaries are shown in Figure 3.3a, and all data outside this were clipped out. I chose imagery from the georeferenced and atmospherically corrected Landsat 5, 7 and 8 Tier 1 Surface Reflectance collections. Using these Landsat satellites 5-8 provided me with free, multi-decadal data with the best trade-off between temporal resolution (from 1984 with Landsat 5 to 2019 with Landsat 8) and spatial resolution (30 meter pixels for Landsat 5-8), which allowed me to use a consistent measure across small and large areas, and over time. The time period chosen is long enough to observe long term

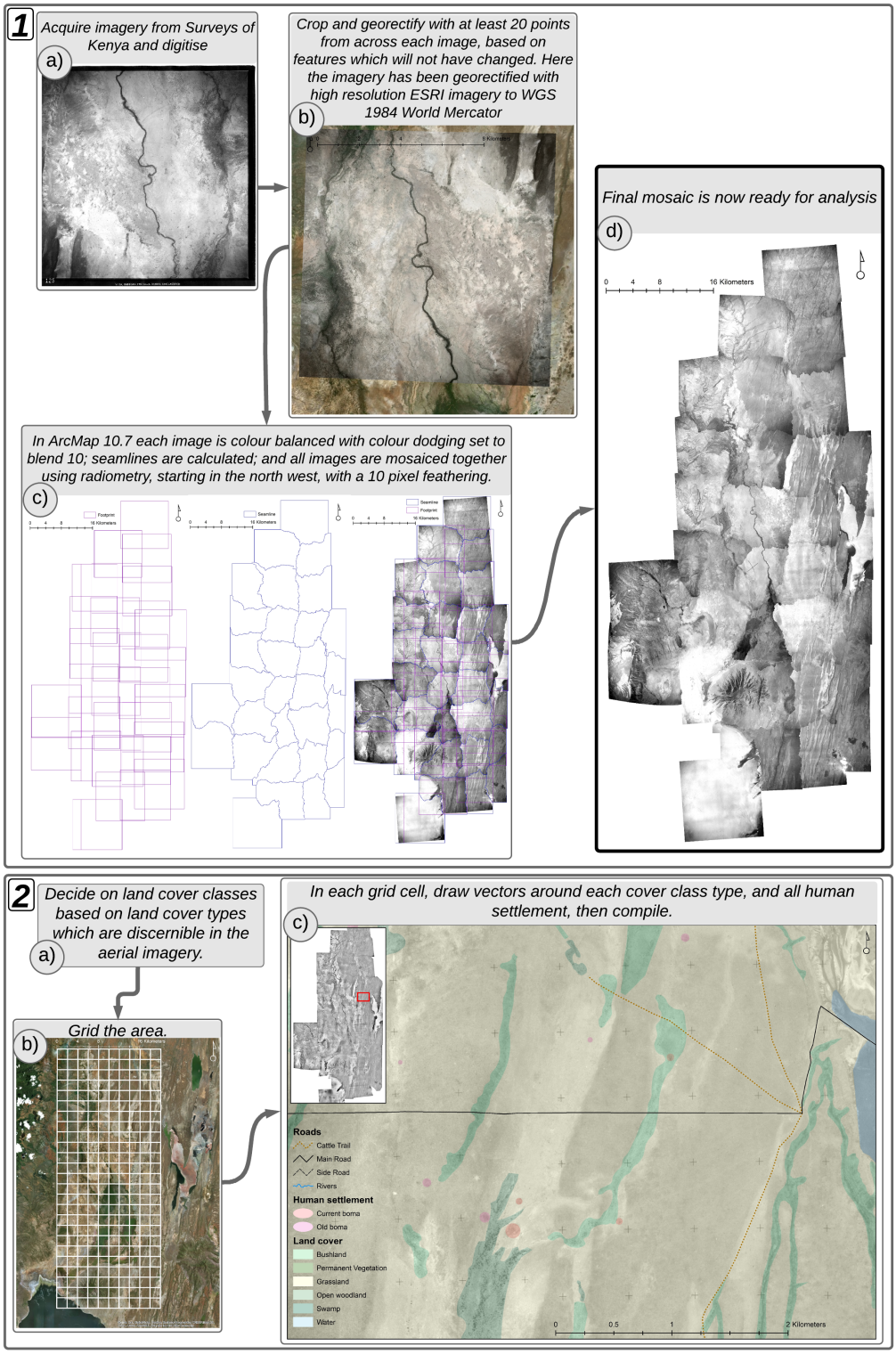


Figure 6.1 The steps taken to convert aerial photograph films to digitised land cover classifications. 1(a) the individual aerial photography films, 1(b) were georeferenced, 1(c) colour balanced, and mosaiced with defined seamlines to produce 1(d) a single final image for further analysis. This was then converted to 2(a) defined land cover classifications by 2(b) gridding the area, and 2(c) manually digitising each land cover type and any visible human settlement as polygons, and linear infrastructure as polylines, for each grid square.

ecosystem changes, without being overly influenced by short term fluctuations which are an integral part of the dynamics of rangeland ecosystems (Brehony et al., 2018).

To perform multi-temporal land cover classification, I used Google Earth Engine (GEE), a cloud-based computational platform that allows users access to petabytes of geospatial and tabular data, including a full archive of pre-processed Landsat imagery (Gorelick et al., 2017), including Landsat 5, 7 and 8 Tier 1 Surface Reflectance collections.

Remote sensing research carried out recently over my study area found that using multi-temporal classification captures seasonal variation which is important for discerning different land cover classes (Hunter et al., 2020b). Therefore, I chose two Landsat tiles for each time of the time periods described below, with one tile taken from the peak of the dry season and one from the peak of the previous, or following wet season, based on highest and lowest vegetation index values, rainfall data from the CHIRPS[3] dataset (Funk et al., 2015a,b), and visual verification. Where cloud free images were not available, clouds and cloud shadows were masked. The temporal time span for this analysis was limited by data quality and availability. Although data are available for the 1970s, these data have low temporal resolution over my study area and were not appropriate for the methods I employed. The time periods chosen were: October 1986 to February 1987 (Landsat 5); December 1994 and February 1995 (Landsat 5); May 2002 to December 2002 (Landsat 7); January 2006 to February 2007 (Landsat 7); August 2015 and December 2015 (Landsat 8); May 2018 and March 2019 (Landsat 8). By starting in 1986, I captured land cover almost two decades before the introduction of the conservation areas, and up to 2019, almost two decades after the introduction of the conservation areas. I also captured land cover at least once every decade, and as data frequency and quality improved, I captured land cover before and after each of the 2009 and 2017 droughts.

For each of the two tiles, at each chosen period, I collected training (70%) and validation (30%) data, for each of six land cover types, chosen based on my prior knowledge of the area (shown Table 6.1), and verified for 2019 with high resolution Copernicus imagery. The random forest classifier is frequently used as the most accurate classification technique in research using remote sensing to map land cover (Xie et al., 2008). I therefore fitted a random forest model using the training data I collected, which classified each pixel for each time period. I began by using all the spectral

[3]CHIRPS data (Climate Hazards Group InfraRed Precipitation with Station data) is a 39-year quasi-global rainfall dataset.

characteristics conventionally used in land cover classification in arid and semi-arid areas (Wegmann et al., 2016).

Table 6.1 Description of each land cover class used in the land cover classification.

Land Cover Class	Description
Water	Pixels which were water both in the wet and dry season.
Closed Forest or Swamp	Pixels which had high vegetation indexes in the wet and dry season with little increase in vegetation indexes from the dry to the wet. This represents Permanent Vegetation which in this region is closed forest or swamp.
Open Woodland	Pixels which showed some vegetation in the dry season and an increase in vegetation index in the wet season. This represents areas with open woodland and understory of grasses and herbs.
Bushland	Pixels which showed some vegetation in the dry season, although not as much as open woodland, and showed an increase in vegetation index in the wet season, although not as great an increase as open woodland. This represents areas of bushland intermixed with grasses and herbs.
Grassland	Pixels which showed very little or no vegetation indexes in the dry season and showed a large increase in vegetation index in the wet season. This represents areas dominated by grasses and herbs with little to no tree or bush cover.
Soda pan/bare ground	Pixels which showed no vegetation in the wet and dry season. In this area these could be bare ground or soda pans.

To assess the accuracy of the classification, the withheld validation data were used to compute a confusion matrix, which tests for re-substitution errors, and an error matrix, which tests the validity of the classified data to the validated reference data (Congalton and Green, 2019; Stehman, 1997). Spectral characteristics were then selected or excluded based on the results of the accuracy assessments. The final spectral bands and indexes chosen[4] were: green, red, near infrared, two shortwave infrared bands, and the Enhanced Vegetation Index (EVI)[5]. The final resulting classified pixels were then rebuilt and mapped as land cover maps for each of the time periods mentioned

[4]Those removed included: ultra-blue, blue, elevation and slope (both from Shuttle Radar Topography Mission - SRTM - v4), Normalised Difference Vegetation Index (NDVI) and the Soil Adjusted Vegetation Index (SAVI).

[5]Formula provided below.

above, in ArcMap 10.4 (ESRI, 2018a). The accuracy of all confusion matrix were between 96-97%, and the accuracy of all error matrix were between 90-94%.

Satellite derived vegetation productivity using the enhanced vegetation index

To understand multi-decadal changes in productivity, I used EVI, which is similar to the Normalised Difference Vegetation Index (NDVI). Changes in vegetation indices, such as NDVI and EVI, are widely used to study changes in vegetation productivity over time, including in arid and semi-arid areas (see Abel et al., 2019). EVI is seen as more robust and suitable than NDVI in areas with high soil reflectance. This background "noise" generated by the soil is particularly prominent in the sparsely vegetated environments which characterise many arid and semi-arid areas (Huete et al., 2002; Pettorelli et al., 2005; Sjöström et al., 2011). EVI can be calculated by:

$$EVI = G\frac{Near\ Infrared - Red}{Near\ Infrared + C_1 Red - C_2 Blue + L} \tag{6.1}$$

Where G is a gain factor, L is the canopy background adjustment, and C_1, C_2 are the coefficients of the aerosol resistance term. The algorithm coefficients I used for calculations were based on MODIS EVI as described in Huete et al. (2002): $L = 1$, $C_1 = 6$, $C_2 = 7.5$ and $G = 2.5$.

The steps taken to generate 30 metre pixel resolution EVI scores from 1984 to 2018, are shown in Figure 6.2. The process used here is an adaptation of the process described by Pironkova et al. (2018). I first created yearly EVI composites in Google Earth Engine[6]. These were imported into R where I masked outliers, and calculated pixel-level Mann-Kendall Tau values with their corresponding p-values, and the Theil-

[6]For interested readers, I will elaborate on some of the most important steps here. There are some small sensor difference between Landsat 5, 7, and 8, which can result in differences in EVI (for instance Roy et al. 2016 found that Landsat 8 vegetation indices were consistently higher than those from Landsat 7) therefore I used the sensor calibration provided by Pironkova et al. (2018). Composites of per pixel EVI values were aggregated to a median yearly value as this minimises the intra-annual seasonal correlation structure in the data. It is possible to model this seasonality (for example Forkel et al., 2013), but this significantly increases complexity, and analyses which have compared methods, conclude that there are only small differences, mostly for pixels with weak trends (ibid.). Focussing only on statistically significant positive or negative trends, as I have done, limits this potential effect. Moreover, aggregating by year was found to be the most robust approach against inter-annual variability for estimating trends and trend changes in EVI, an important consideration in arid and semi-arid rangelands. Finally, it also results in fewer time series points, which decreases the risk of detecting false positive trends (ibid.).

Sen slope value. The Mann-Kendall test p-value is an estimate of the probability that the observed trend could have occurred by chance and the Theil-Sen slope quantifies the per pixel rate of change in vegetation greenness[7]. Combining the Mann-Kendall Tau with the Thiel-Sen slope estimator can help to usefully detect significant total increases or decreases in vegetation over time (Erasmi et al., 2014; Fraser et al., 2011). Finally, although satellite derived vegetation indices are directly correlated with plant productivity (Pettorelli et al., 2005), they cannot capture changes in functional types, or changes in species. Therefore, I used both the results from the land cover change analysis in conjunction with changes in vegetation productivity when interpreting my results.

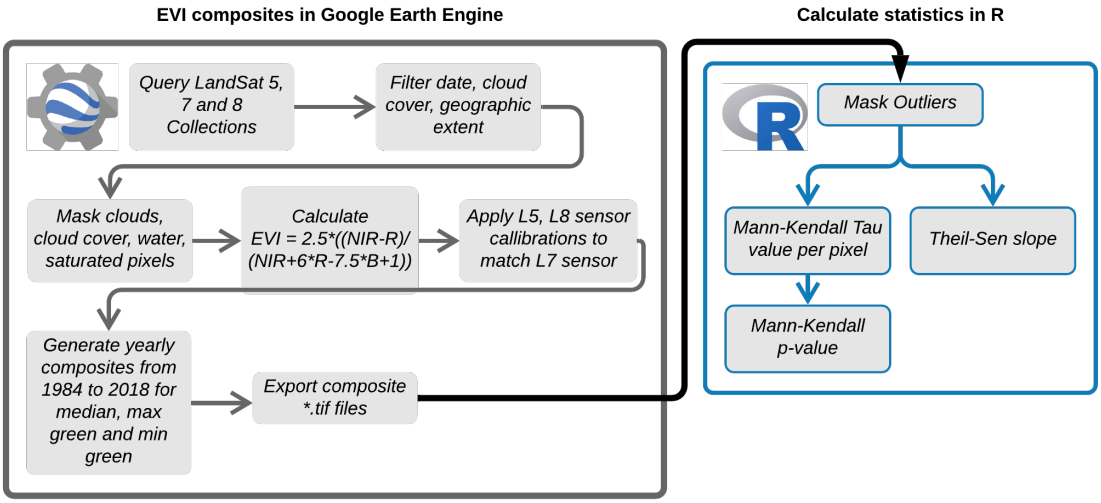


Figure 6.2 The steps taken to understand multi-decadal changes in vegetation productivity. The left panel describes the steps taken in Google Earth Engine to generate yearly median, maximum and minimum EVI composites, the left side describes how R was used to generate statistics from the time series of these composites.

[7]The Mann-Kendall non-parametric test for monotonic trends (Kendall, 1975; Mann, 1945) and the Theil-Sen non-parametric slope estimator (Sen, 1968; Theil, 1950) are both robust at examining significant long-term trends in time series (Fraser et al., 2011) and are the most widely accepted methods in environmental sciences to verify the existence of significant long-term trends in time series (Erasmi et al., 2014). They are both resistant to outliers, and can be computed despite missing values, which was the case for 1988-1994 and 1996-1998 in this analysis, because of a gap in Landsat data over East Africa for those years. In Figure 6.7 and Figure 6.8 I have limited my interpretations to pixels which had a value of $p<0.01$.

6.2.3 Changes in wild animal population numbers

As I discussed in Chapter 3.7, Olkiramatian and Shompole continue to support an intact community of large herbivores (excepting black rhinoceros, *Diceros bicornis*), 21 species of carnivore (Schuette et al., 2013b) and a growing population of elephants (*Loxodonta africana*) (Ahlering et al., 2012). To examine the dynamics and trends in livestock and wild animal numbers over the last four decades, I used aerial census data collected and commissioned by Kenya's Department of Resource Surveys and Remote Sensing of Kenya (DRSRS)[8], the African Conservation Centre, and the South Rift Association of Land Owners[9].

6.2.4 Statistical models for data from household surveys

The statistical models I present here are logistic regressions fitted with survey adjusted equivalents to generalised linear models (GLMs) with a logit link function, based on the *survey* package[10] (Lumley, 2019, version 3.35-1) and *srvyr* (Ellis, 2019, version 0.3.5), through the *tidyverse* package environment (Wickham, 2017, version 1.2.1) in R (R Core Team, 2019). Survey based GLMs do not use maximum likelihood sampling-weighted least squares, but model summaries give Wald tests for each coefficient in the model (Lumley and Scott, 2017)[11].

[8]DRSRS was set up as the Kenya Rangeland Ecological Monitoring Unit in 1976 to provide continuous long term data on Kenya's rangelands. DRSRS have used Systematic Reconnaissance Flight (Norton-Griffiths, 1978 as quoted in Ogutu et al., 2016) methods since 1977 to enumerate all mammals that can be reliably counted from the air. Although aggregated analyses for Kajiado county exist (Ogutu et al., 2014), I have isolated the South Rift sectors, which includes data from 1978 to 2018 for the entirety of both Olkiramatian and Shompole. The results I present have already been analysed with Jolly's method II (Jolly, 1969) to show animal population estimates which were then fitted with a polynomial smooth with shaded standard errors to understand trends over time.

[9]The data were made available through the South Rift Association of Land Owners.

[10]Using other "ordinary" GLM software which are not written with sampling weights in mind can result in incorrect standard errors (and other consequent statistics), although point estimates would still be accurate (Lumley and Scott, 2017).

[11]Logistic regressions can be calculated with the *"family = quasibinomial()"* term in the *survey* command. However, unlike standard (non-survey) logistic regressions, model fitting doesn't use maximum likelihood estimation as binomial likelihoods are not appropriate for weighted correlated survey data. Instead, the Wald test is used (a version of the Rao-Scott second order corrected t-test, where the t-statistic is found as the ratio of the estimate, to the standard error, with a p-value which is based on comparing the square of the t-statistic to an F-distribution). As Lumley and Scott (2017) show, the *survey* package now also includes a calculation of AIC (defined using the Rao-Scott approximation to the weighted loglikelihood) and BIC (defined as the approximate multivariate Gaussian models on regression coefficients from the maximal model, implied by each submodel).

When constructing GLMs, I included a base model, so that it could be interpreted as the direct empirical relationship between the dependent and explanatory variables. I also included adjusted models, to understand how this relationship changes when other relevant variables are hypothetically held constant, and to understand the effect of other explanatory variables[12]. When the adjusted models resulted in a smaller sample size, the same data points were removed from the base model, so that likelihood ratio tests would be valid. I also calculated the odds ratio for base models, and the adjusted odds ratio for adjusted models, which can be understood as the relative likelihood of a household with a particular characteristic being allocated to the category of the dependent variable.

I present the coefficients of the base and adjusted models in the form of a forest plot using the *jtools* package (Long, 2019). I present the odds ratios, adjusted odds ratios, and the model selection and fitting statistics in Table form. Finally, I present the logistic model predictions for the Wealth Index in particular, as predictor effect plots (see Fox and Weisberg, 2018), using the *jtools* package (Long, 2019). The selection of model predictors, and model fitting were achieved through the following testing statistics:

- testing the inclusion of model predictors with the Wald test using *regTermTest()* from the *survey* package;
- inspecting the following diagnostic plots: residuals against predicted values plots, partial residuals against actual values, residuals against leverage plots, scale location plots;
- inspecting survey-based equivalents to Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) from the *survey* package (see Lumley and Scott, 2017);
- inspecting McFadden's Pseudo R_2, Cragg-Uhler's Pseudo R_2, estimated dispersion parameters, all using the *summ()* function in the *jtools* package.

[12]Including more variables in the adjusted model can result in multicollinearity. Therefore, all variables were tested for multicollinearity, inflation factors, heteroskedasticity, and condition indices (details of these tests are given). If multicollinearity was an issue, then only the variable with the greater explanatory power was kept.

6.3 Changing ecosystems

Based on a social-ecological systems perspective, it is necessary to understand what is happening ecologically in the South Rift. I will first examine changes in land cover, and then I will focus on changes to the ecological units of importance and relevance to this research. Here, I will not present a causative model to show the exact impact that the introduction of the conservation areas had on the ecosystems in the South Rift. Rather, it will be an attempt to track ecologically relevant changes over time, and correlate and triangulate these data with data and information derived from other sources, to give meaning and sense to my findings.

In this sense, it is important to be careful not to naively compare what is happening inside the areas recently set aside as the conservation areas, and areas outside. What I have already found and discussed in Chapter 4 was that the conservation areas were indeed established in a location that had pre-existing properties which made them unique. These areas were seasonally used and managed as drought grazing refuges, predominantly because of the presence of high tsetse fly densities. These areas also included several woodlands and streams, and had higher densities of wild animals. Failing to account for the historical context can result in over-, or indeed under-estimation of the effectiveness of conservation, and the impacts of other forms of land management (Ferraro and Hanauer, 2014; Ferraro and Pressey, 2015).

6.3.1 Land cover changes over time

I will now examine how land cover has changed in the South Rift over the past 35 years or so, up to 2019. The percentage change over time of the land cover classifications for each of the three land use zones in both Olkiramatian and Shompole GRs are shown in Figure 6.3. This allows us to visualise overall changes for each of the land cover types, with a particular focus on the trend, and less focus on the numbers at each time interval which will vary slightly due to pixel resolution. Figure 6.4 then shows the results of the land cover classifications for each time period, which allows us to identify where changes in land cover have occurred (Figure 6.4), while remembering that this analysis

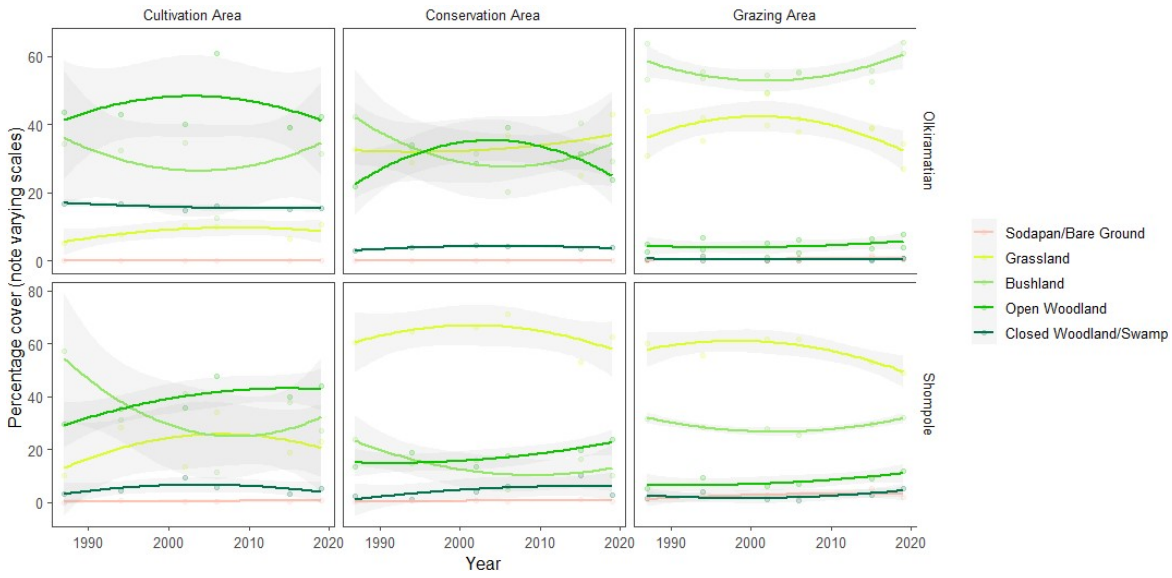


Figure 6.3 The percentage change in the five land cover classifications for each of the three land use zones in both Olkiramatian (top) and Shompole (below). The points correspond to actual observed percentages, calculated based on pixel classification. The lines represent a polynomial fit with standard errors in grey shading. Note that the scales of each row are different. Data from 2006 should be interpreted with caution as there were few cloud free images over this period, and the ones that were used still had cloud cover and cloud shadows at higher elevations.

was conducted at a 30m pixel resolution. For reference, the geographic coverage of the different land use areas and location names that I refer to are found in Figure 3.3a[13].

I will now describe the changes in each of the different land cover types, followed by a short summary.

Taken together, Figures 6.4 and 6.3 show that in Shompole, grassland first increased up to around 2002, and then decreased in all land use zones, with the greatest decrease in the grazing area. Increases in other land cover, together with the results from Figure 6.4 suggest that grassland is replaced by increases in closed woodland/swamp, bushland, and soda pan/bare ground. Furthermore, Figure 6.4 also shows how the Ewaso Nyiro River has shifted back and forth, east to west, which, together with its slow movement north has been largely responsible for this loss of grassland.

In Olkiramatian there is very little grassland in the cultivation area, and there has been a slow steady increase in grassland in the conservation area. However, an increase is then followed by a decrease in grassland in the grazing area from around 2006,

[13]I recognise that interpreting Figure 6.3 and Figure 6.4 together is not easy, as I have to refer to specific location names, but the analysis I provide below, together with the location names provided in Figure 3.3a should give a much clearer picture of what changes have occurred, and where they have occurred.

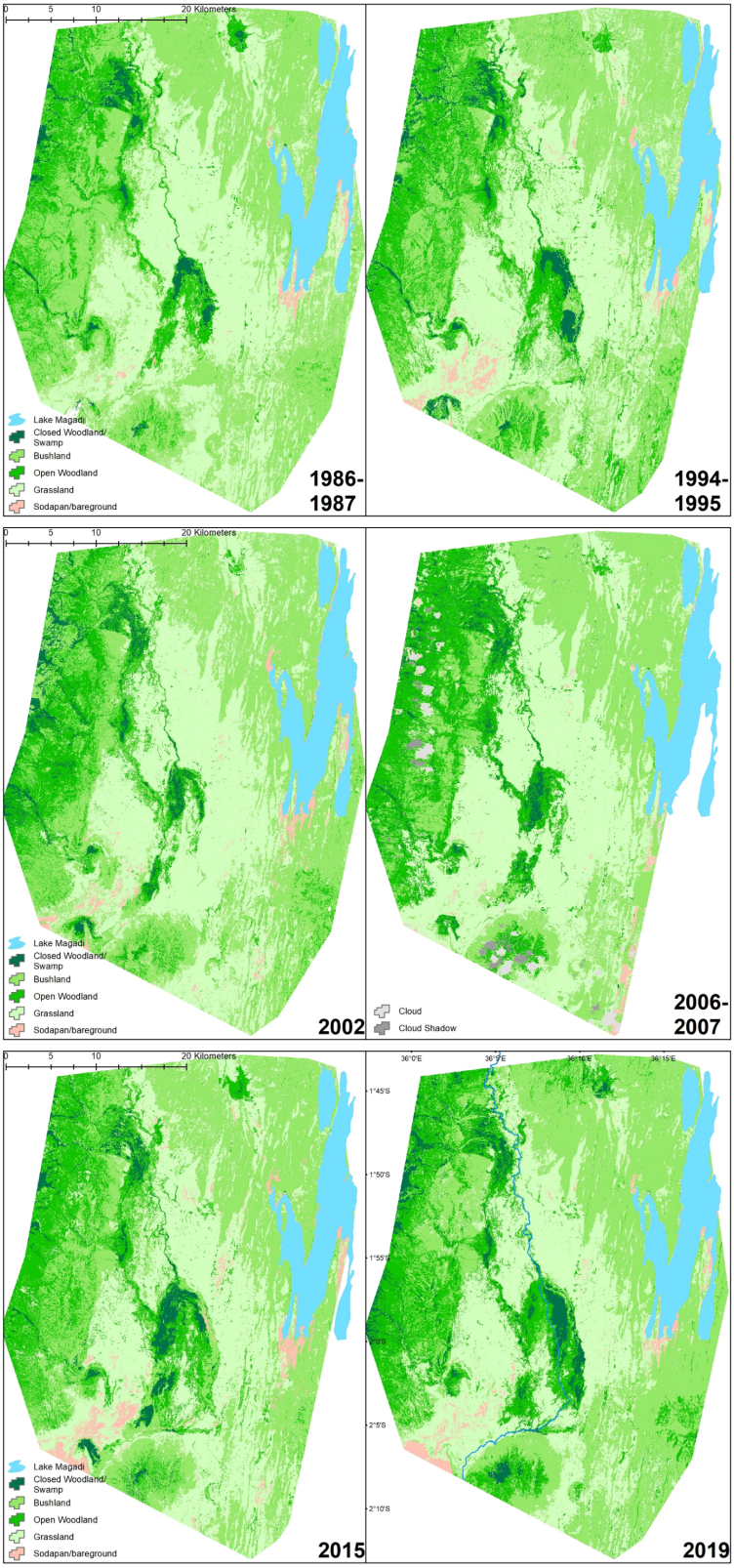


Figure 6.4 Land cover classification maps for each of the years shown. Data from 2006 should be interpreted with caution as there were few cloud free images over this period, and the ones that were used still had cloud cover and cloud shadows at higher elevations. The blue line in 2019 represents the current route of the Ewaso Nyiro River.

which seems to correspond with a decrease, and then increase in bushland. Figure 6.4 suggests this is largely due to changes in the northern part of Olkiramatian. Overall, there appears to be a greater percentage of grassland in Shompole than Olkiramatian.

Figure 6.3 shows marked decade-to-decade variation in the bushland classification in the cultivation area for both GRs. This variability might be caused by cultivation itself, or the clearing (and re-colonising) of bush, to cultivate. In the conservation areas, land classified as bushland appears to have decreased, in both Olkiramatian and Shompole. In the grazing areas, however, bushland decreased slightly up to around 2002 in both Olkiramatian and Shompole, and is now increasing again. Some interviewees noted that the areas near their households in the grazing area "the grass was not like how it is... it has become bush"(I22) or it "used to be open with few young trees, now it is bush" (I5). The increase of bushland is a common phenomenon in many rangelands, which is believed to be facilitated by reductions in fire frequency and intensity, increases in livestock grazing intensity, and increases in atmospheric CO_2 (Archer et al., 2017; Vehrs and Heller, 2017). Overall, there appears to be a greater percentage of bushland in Olkiramatian than in Shompole.

The open woodland classification is most extensive in the cultivation areas of both GRs. For Olkiramatian, open woodland increased in the cultivation area up to the mid-2000s, but has since decreased again. Meanwhile in Shompole there has been an overall increase in open woodland from 1986 to 2019. This appears most likely due to an increase over time of open woodland in the west, up the escarpment (Figure 6.4). The actual data points in Figure 6.3 show that Olkiramatian has seen increases and decreases in open woodland in the conservation area, to which the polynomial line does not fit well. It is possible that this could be related to a dramatic increase in elephants (*Loxodonta africana*) in Olkiramatian's conservation area over the last 10 years (see Figure 6.9 below; Morrison et al., 2016). Olkiramatian appears to have very little open woodland in their grazing area, and this has remained largely unchanged from 1986 to 2019. Shompole has seen a steady increase over time in open woodland in both the conservation area, and the grazing area.

The closed woodland/swamp classification represents key drought grazing resources for livestock and wild animals (Western et al., 2015a). In Olkiramatian, the cultivation area (Nguruman) supports the greatest percentage of this classification, but it has decreased slowly over time (see also Figures 6.5b and 6.6). The amount of closed woodland/swamp in Shompole's cultivation area (Pakaase) saw a big increase up to 2002, and then decrease to a low again in 2015, which appears to be predominantly

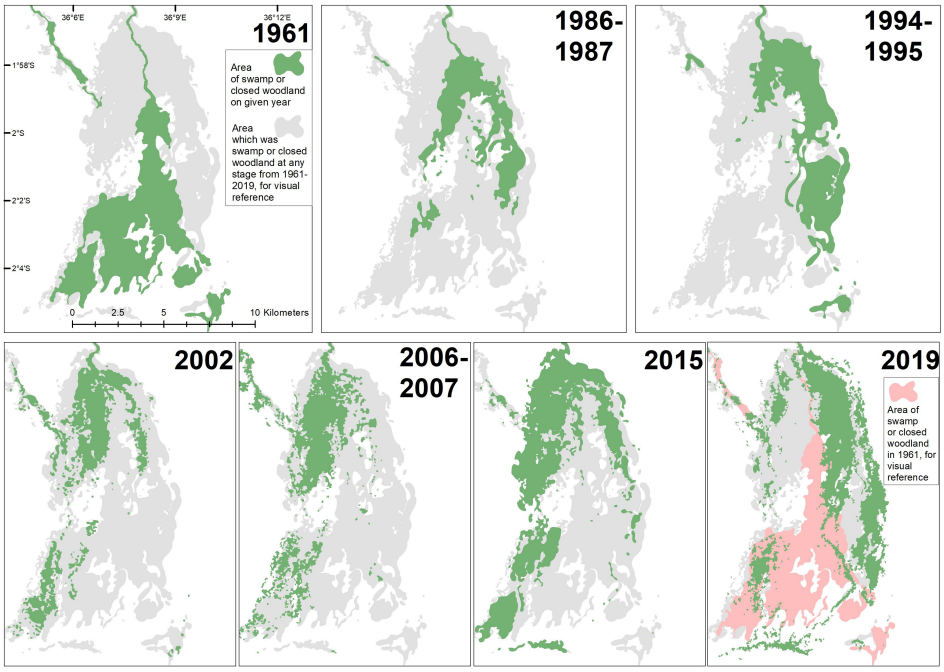
due to increases, followed by decreases in closed forest on the escarpment in the West, in the area which neighbours the Loita Forest, as well as increases in clearing along rivers, for irrigated cultivation (Figure 6.6). For Shompole, the small increases in closed woodland/swamp in the conservation area and grazing area are largely driven by the shifting east and west of the Ewaso Nyiro River. When the Ewaso Nyiro River flows to the east, Figure 6.4 shows that most closed woodland/swamp is also in the grazing area (e.g. in 2019 and 1994-1995). Likewise, when the river flips to flow to the west side, most closed woodland/swamp lies in the conservation area, as seen clearly in Figure 6.5a.

Finally, the soda pan/bare ground classification has only marginally increased in Shompole over time, particularly in their grazing area (approximately a 3% increase). Figure 6.4 shows that this is largely due to an increase in 2015, when two areas were classified as soda pan/bare ground: 1) a large area just north of Lake Natron in Tanzania, in the South West of the map and; 2) an area south of Lake Magadi, in the East of the map.

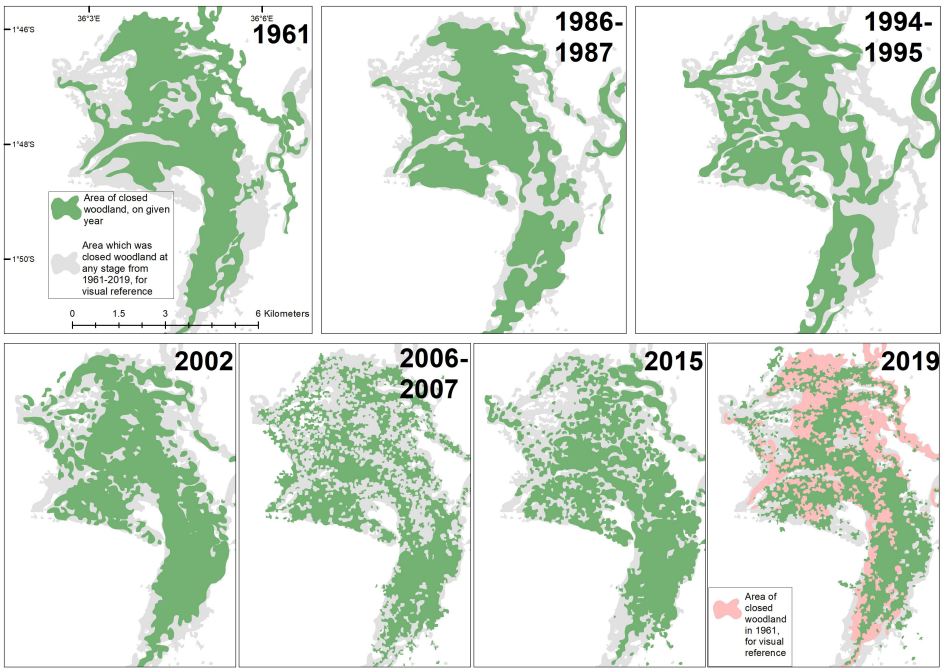
Overall, this analysis shows that each of the land use zones have different land cover characteristics, that there is land cover heterogeneity in each of the different land use areas, and that these are changing over time. It is not always clear what is driving the changes, other than in the areas which have been converted to cultivation, and the effect of the Ewaso Nyiro River switching route. This appears to have a significant impact on land cover, both all along the river, and particularly where the river spreads out to a swamp. Given that these shifts in the route of the river are beyond local land management, the ecological changes that this route switching results in are further aspects of the local social-ecological system which are difficult to predict, and to which local people have to adapt. Furthermore, it is likely that the large scale clearing of trees in the 1930s to 1940s, as well as the ongoing abstraction of significant amounts of water by Magadi Soda Company (as discussed in Chapter 4.7) is also continuing to have an effect on today's land cover, although it is hard to quantify this effect precisely.

6.3.2 Changes to key dry season grazing areas: woodlands and swamps

To examine what is happening in the key late dry season grazing areas for livestock and wild animals, the woodlands and swamp (Western et al., 2015a), I have included

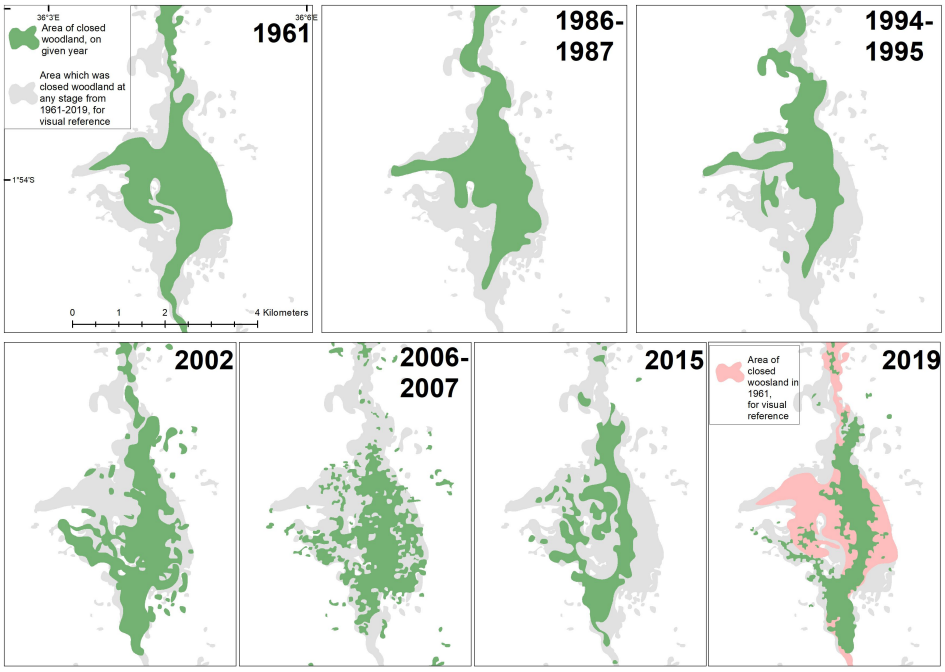


(a) Illustrated changes from 1961 to 2019 for the Ewaso Nyiro swamp.

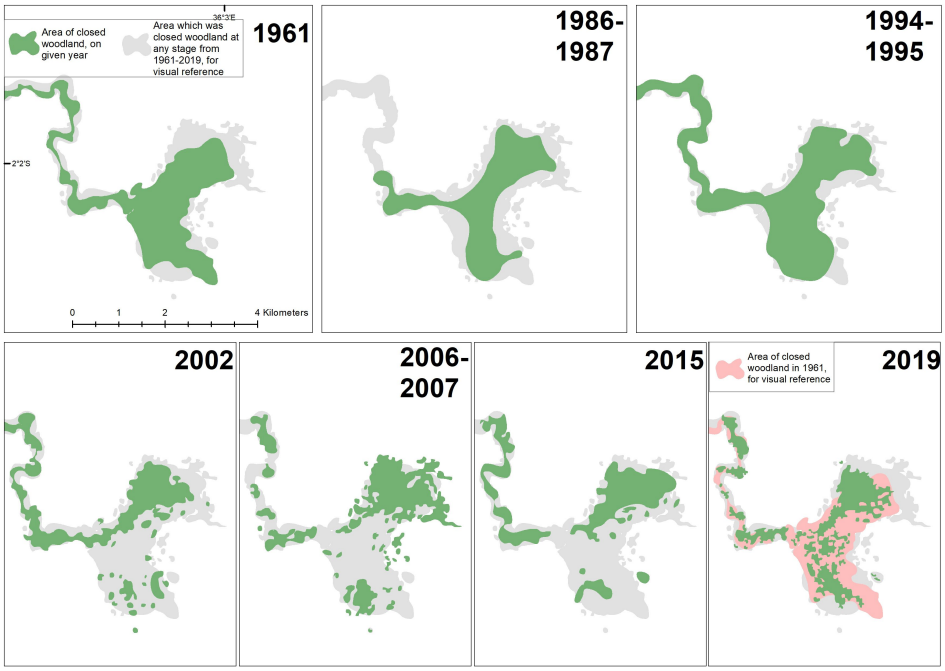


(b) Illustrated changes from 1961 to 2019 for Nguruman Forest.

Figure 6.5 (continued onto next page) - **Illustrated changes from 1961 to 2019 for a) the Ewaso Nyiro swamp; b) Nguruman Forest; c) Orng'arua Forest (also known as Sampu Forest); and d) Eng'aboli Forest (also known as the Fig Forest).** As the legend shows, the green areas represent areas of closed woodland or swamp (just for a), for each given year. The grey area provides a useful reference as the area which was closed woodland or swamp at any stage from 1961-2019. In both a) and b), the 2019 frame includes a pink illustrated area, which represents the area covered by closed woodland or swamp (for a) in 1961, and allows us to look at the longer term changes which are not as obvious when looking at incremental changes.



(c) Illustrated changes from 1961 to 2019 for Orng'arua Forest.



(d) Illustrated changes from 1961 to 2019 for Eng'aboli Forest.

Figure 6.5 continued - Illustrated changes from 1961 to 2019 for a) the Ewaso Nyiro swamp; b) Nguruman Forest; c) Orng'arua Forest (also known as Sampu Forest); and d) Eng'aboli Forest (also known as the Fig Forest). As the legend shows, the green areas represent areas of closed woodland or swamp (just for a), for each given year. The grey area provides a useful reference as the area which was closed woodland or swamp at any stage from 1961-2019. In both a) and b), the 2019 frame includes a pink illustrated area, which represents the area covered by closed woodland or swamp (for a) in 1961, and allows us to look at the longer term changes which are not as obvious when looking at incremental changes.

data from 1961[14]. As mentioned above, Figure 6.5a shows that the position of the Ewaso Nyiro swamp is in constant flux, predominantly flipping between an east and a west branch[15].

When the river shifts route, Figure 6.4 shows that it leaves behind an area which becomes open woodland, bushland, and grassland. Each time that the river switches, it also seems that the swamp gradually moves further north, up the river (Figure 6.5a). From 1961 to 2019, there has been a shift of close to 5km (note the pink area in Figure 6.5a is the 1961 area, and the green represents 2019). It is possible that this northward movement is tied up to a build-up of material that flows down the river (trees, branches, silt, etc.), and the deposition of sand and silt, which clog up the swamp mouth as the water slows down. Some local people speculate that this is as a result of the clearing of trees and erosion run off upstream, particularly in the Mau Forest, the main catchment of the Ewaso Nyiro River, which is over 75 km further upstream from Olkiramatian GR (R48).

Figure 6.5b shows the changes over time for the Nguruman Forest, which is within Olkiramatian's cultivation area. Overall, the forest is now patchier, and has been cleared for irrigated cultivation in many places (Figure 6.6).

There have also been changes to other woodlands such as Orng'arua and Eng'aboli Forests, both important drought grazing refuges found within the conservation areas (Western et al., 2015a), which have started desiccating. For example, Figure 6.5c shows there have been shifts in the extent of the Orng'arua Forest, which depends on water from the Nguruman area in the north, and the Sampu River to the west. This could be partly caused by the significant increase in the area under irrigated cultivation in Nguruman since 1961, as seen in Figure 6.6b. However, Figure 3.3 shows how the Oloibortoto River and the Sampu River flow down the rift valley escarpment from the Loita Forest and through the Orng'arua Forest. The ongoing abstraction from Nguruman's Oloibortoto River of hundreds of thousands of litres a day, by Magadi Soda Company for their factory, and for community water points across Olkiramatian and Shompole GRs, mentioned in Chapter 4.7, is likely to be having an even greater effect on this. Likewise, water abstraction from the Sampu River for community water

[14]As mentioned in my methods, data from 1961 were based on aerial photographs, and data from 1986 to 2019 is based on Landsat imagery. Therefore, any findings from the useful opportunity to look at changes from 1961 to 2019 have to be cautiously interpreted.

[15]This is of course well known to people living in the area, and was also recorded by Lambin and Mertens (2001). The most recent flip of the river occurred in 2015.

points across the two GRs (see Chapter 4.8) is also likely to be changing the extent of the Orng'arua Forest.

A similar situation pertains in the Eng'aboli Forest shown in Figure 6.5d which depends on water from the Pakaase River, where irrigated cultivation has increased over recent decades (increase in cultivated area in Pakaase is shown in Figure 6.6) and water is now being piped to reach Pakaase village, the dispensary and the school.

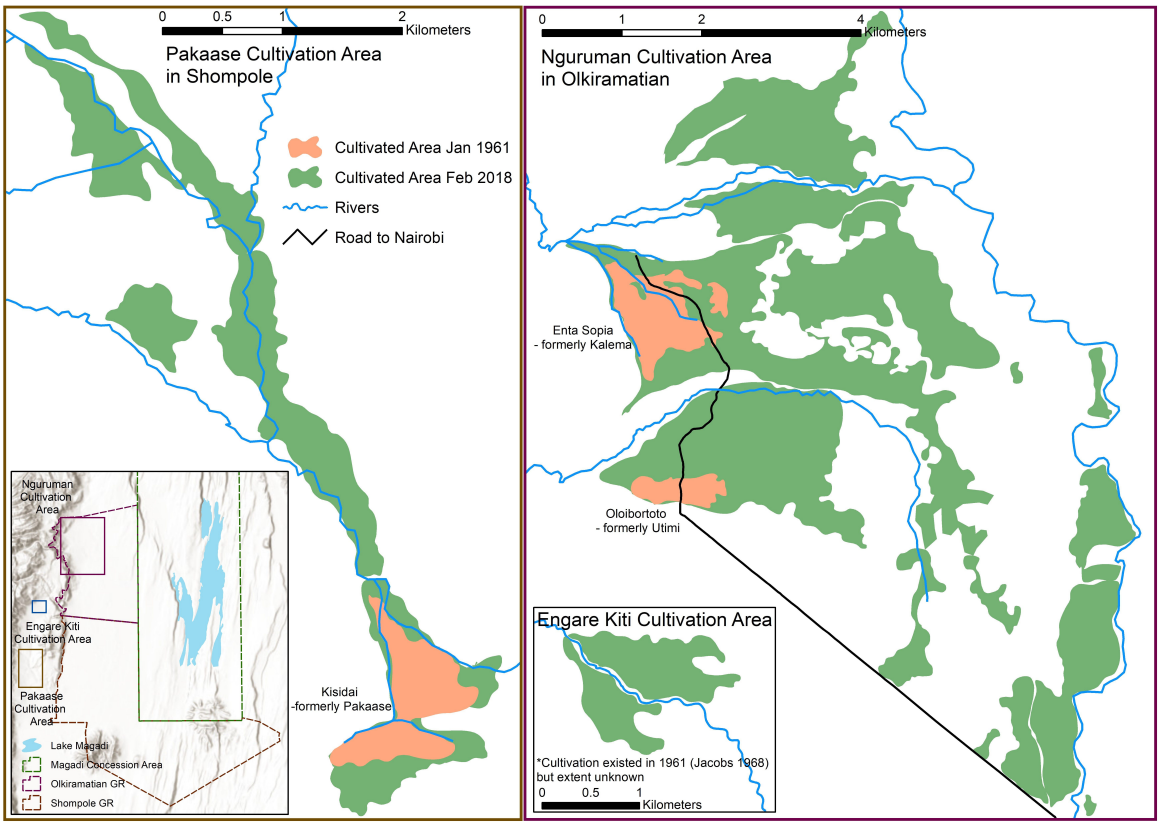


Figure 6.6 The areas under cultivation in 1961 compared to 2019 for a) Pakaase - Shompole's cultivation area on the left; b) Nguruman - Olkiramatian's cultivation area on the right; and c) the recently re-used Engare Kiti cultivation area in the centre.

6.4 Changing vegetation productivity, composition, and wild animal numbers

6.4.1 Changes in vegetation productivity

Multi-decadal changes in vegetation productivity are shown in Figures 6.7 and 6.8, estimated from the remotely sensed Enhanced Vegetation Index (EVI), which is widely used to study changes in vegetation productivity over time in arid and semi-arid areas

(Pettorelli et al., 2005; Sjöström et al., 2011, Abel et al., 2019). There are five relevant and significant trends I will discuss here. Refer to Figure 3.3 for place names used in the following description.

The most obvious areas which have witnessed a significant increase in productivity are related to movements of the Ewaso Nyiro River. When the river flows to the west there will be significant increase in productivity in the newly flooded areas over the proceeding years until the river shifts. Then there will be a consequent drop in productivity in this area again. The river has only recently shifted to the west once more. Figures 6.5, 6.7, and 6.8 suggest a significant increase in productivity can be expected in the form of closed woodland, closed bushland and swamp vegetation, where the river now flows, with a concurrent desiccation of trees, bushes, grasses and swamp vegetation where the river no longer flows. This is represented by the bright red areas in the middle of the closed woodland/swamp, and the area on the edge of Lake Natron in the South West in Figure 6.8.

Secondly, the cultivation areas of Olkiramatian and Shompole have seen sharp decreases in productivity, with some pockets of increases in productivity (Figures 6.7a and 6.8). The decreases are probably the result of clearing of riparian vegetation, which would have high EVI values year-round due to the presence of perennial streams, to make way for crops, which have seasonal productivity. At the same time, there has been an increase in woodland in the south eastern part of Olkiramatian cultivation area, which have already been discussed in relation to Figure 6.5b).

Thirdly, as mentioned above, forests such as Eng'aboli (shown in Figure 6.5d) and Orng'arua (shown in Figure 6.5c) are likely to have started desiccating because of upstream water abstraction for the Magadi Soda Company's pipeline, the community's water points pipeline, and irrigated cultivation.

Fourthly, there are small patches of pixels with increased productivity across all areas in both GRs. Based on the data for land cover changes (Figure 6.4 and Figure 6.3), these correspond to areas which have changed from grassland, to bushland or open woodland over the past 20 years or so. As mentioned above, conversion of grassland to bushland and open woodland is common in many rangelands, and is facilitated by several factors which are also relevant in both GRs, including reductions in fire management, increases in livestock grazing intensity, and increases in atmospheric CO_2 (Archer et al., 2017; Vehrs and Heller, 2017).

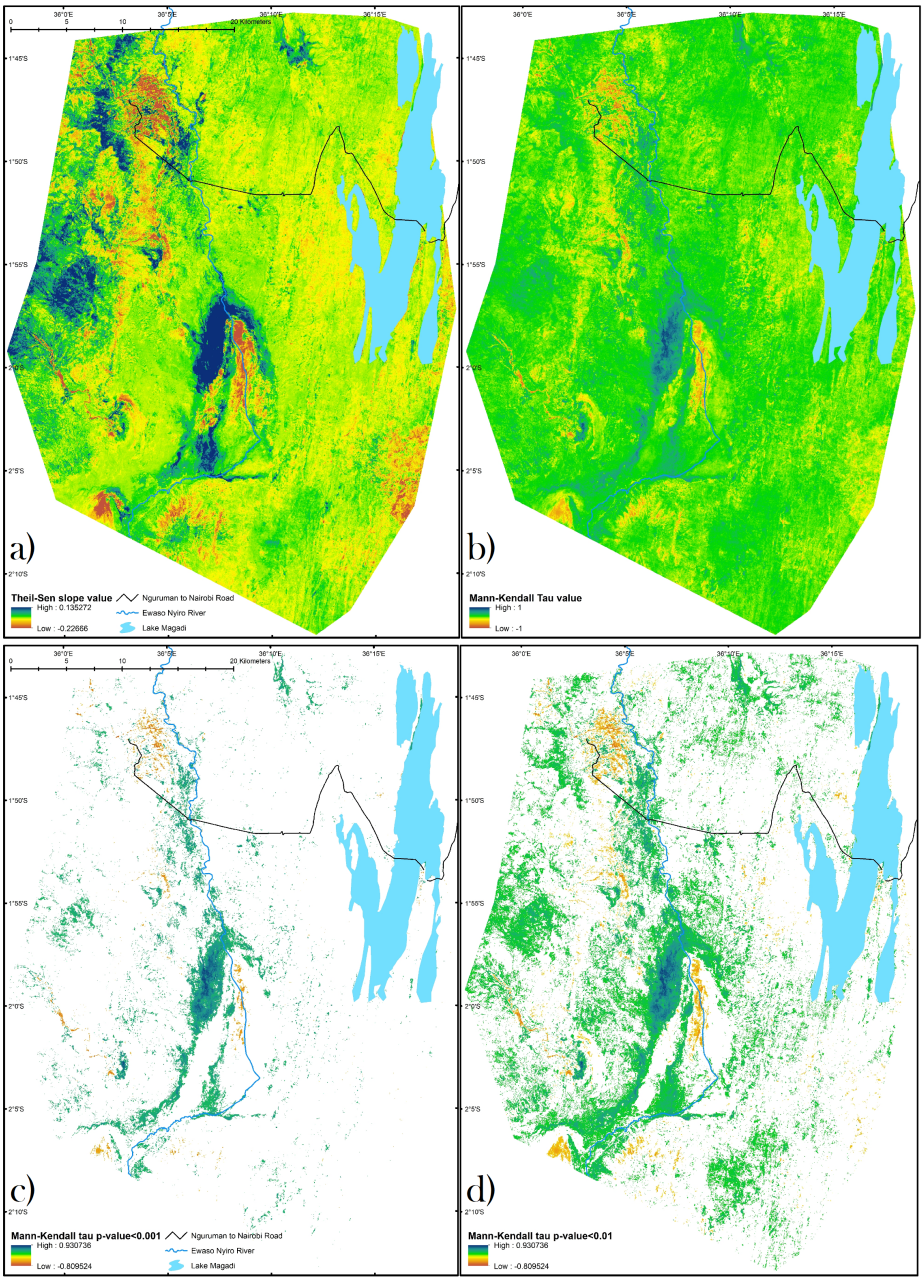


Figure 6.7 Changes in vegetation productivity from 1986 to 2019 in the South Rift. a) The rate of linear change in EVI per pixel, from 1986 to 2019, based on the Thiel-Sen slope value. Areas of dark blue indicate a faster increase in EVI, and areas of dark red indicates a faster decrease in EVI. b) The linear trend in EVI per pixel, from 1986 to 2019, based on the Mann-Kendall Tau values. Areas of dark blue indicate an increase in EVI over time, and areas of dark red indicate a decrease in EVI over time. c) The probability estimate to a $p<0.001$ level, that the observed trend from the Mann-Kendall Tau values shown in b) could have occurred by chance. Areas with a value higher than $p<0.001$ are masked out. d) The probability estimate to a $p<0.01$ level, that the observed trend from the Mann-Kendall Tau values shown in b) could have occurred by chance. Areas with a value higher than $p<0.01$ are masked out.

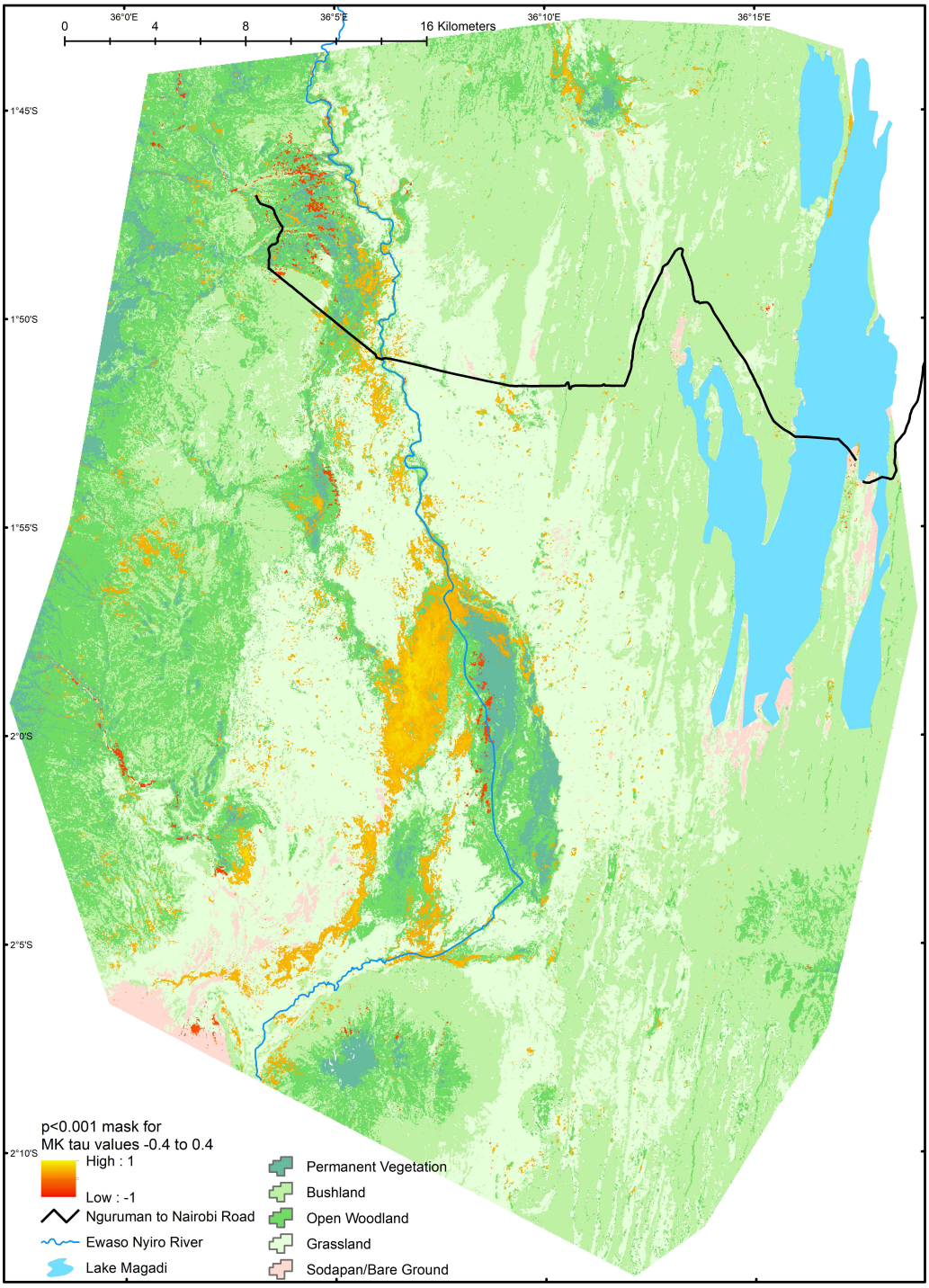


Figure 6.8 Areas with significant changes in productivity overlaid on 2019 land cover classification. To show this, the Mann-Kendall Tau values of each pixel, with a statistical significance of $p<0.001$, from 1986 to 2019, are overlaid on the 2019 land cover classification. Areas in bright yellow indicate a statistically significant increase in EVI over time, and areas of dark red indicate a statistically significant decrease in EVI over time.

Finally, there were also small patches of decreases in productivity in the grazing area (see Figures 6.7a, 6.7b and 6.7d), which only tended to statistical significance at the $p<0.01$ level and are therefore masked out in Figures 6.7c and 6.8 which show $p<0.001$ statistical significance. These areas correspond with the current near-permanent settlement locations close to water points, schools, and clinics. Given that Butt (2010) found that areas closest to households are consistently impacted by livestock across all seasons in a neighbouring area, it is possible that over time there will be decreases in productivity in these areas near households with concurrent redistribution and concentration of nutrients into livestock enclosures (Augustine, 2003).

Overall, the results from both the long term EVI trend analysis and land cover change confirm that the areas which have seen the greatest change in productivity, are those that have seen land cover change.

Some of these changes are a result of both direct and indirect changes in land management, notably in the two cultivation areas where significant reductions in EVI are directly related to clearing trees for cultivation, or in the forests, where water capture for water pipelines by Magadi Soda Company and the community (Chapter 4.8) are likely to have changed the woodlands without any direct removal of trees. However, some of the other changes are not directly the result of local people's impact, such as the changing position of the Ewaso Nyiro River, and therefore the river fed swamps and closed woodland.

6.4.2 Herbaceous species composition

Understanding changes in multi-decadal land cover change, and vegetation productivity are no doubt useful to understand long term ecological changes. However, if possible, it is also important to understand species changes too.

In many grasslands across the globe, there is evidence that productivity and biodiversity are interdependent with each other, and with grazing pressure, particularly from livestock (Cardinale et al., 2007; Georgiadis et al., 1989; Guo, 2007; Tilman et al., 2001). Any changes in productivity depend on the vegetation species, which for herbaceous species in particular, in turn depends on grazing (Leisher et al., 2012).

Long term changes in herbaceous species composition are hard to assess. However, a team of researchers, including myself, have submitted a paper (Hunter et al., *in review*) about changing herbaceous species composition in this area. I will only summarise the results which are relevant to this research.

6.4 Changing vegetation productivity, composition, and wild animal numbers

In both Olkiramatian and Shompole, patterns of herbaceous species composition and community structure varied between the grazing area, and the conservation area (as the dry season grazing reserve). The gradient of variation in forage biomass matched predictions associated with a gradient of lower biomass higher nutrition in the grazing area[16], to greater biomass and lower nutrition in the conservation area, as the dry season grazing reserve[17].

These patterns were generally consistent across years, even with rainfall variability, although greater rainfall also resulted in greater overall number of species, including both herbaceous flowering plant species and grasses. This grazing resource heterogeneity is important in maintaining the abundance, diversity, and resilience of both livestock and wild animals (Fynn et al., 2016; Owen-Smith, 2004). It reflects variations in topography, hydrology, and grazing pressure (Russell et al., 2018) and is likely maintained by the current land use management where livestock follow the gradient of variation in forage biomass (Fynn et al., 2016).

Local herd owners were in agreement about the importance of grazing resource heterogeneity for livestock rearing, but that they were also concerned about multi-decadal changes in herbaceous species composition, a view retold by one interviewee (I38), who describes a decrease in perennial grasses and increase in annual grasses in the grazing area: "[referring to perennial grasses] in the past, even if the grass was eaten, the next morning you would get them again ... those shoots would last, but now those are gone. Now the grasses that are here [referring to annuals grasses in the grazing area] come out very fast, and they finish very quickly" (I38).

However, as described above, people also recognised the importance of maintaining the conservation area, as a late dry season grazing reserves, epitomised by the following quote: "like now, there is a grass species ... [which is] only in the conservation area. [Livestock] will graze on that grass in the conservation area until it is completely gone. So from my perspective [the conservation area] hasn't brought many costs, it actually

[16]This area contained nutritious forbs like *Indigofera sp.*, and annuals such as *Sporobolus cordofanus*.
[17]This area contained large areas of the taller perennial grasses like *Cynodon plectostachyus* and *Sorghum bicolor*.

brings a few benefits" (I27).

6.4.3 Changes in wild animal numbers

Olkiramatian and Shompole continue to support a diverse community of herbivores, and a large number of carnivores (Ahlering et al., 2012; Russell et al., 2018; Schuette et al., 2013b), including charismatic megafauna like elephants (*Loxodonta africana*) and lions (*Panthera leo*), although there are no longer any black rhinoceros (*Diceros bicornis*)[18]. Densities of many wild animals are comparable to most government protected areas in East Africa, and livestock densities are approximately three times higher than wild herbivore densities (Schuette, 2012). However, as Figure 6.9 shows, the total numbers of these species has varied over time.

Since 1977, there has been a large decrease in most wild animal species which can be enumerated with aerial surveys (Figure 6.9). Some wild animal species appear to have decreased rapidly, before either stabilising at lower numbers, or increasing again slightly, since 1977, such as eland (*Taurotragus oryx*), giraffe (*Giraffa camelopardalis tippelskirchi*), Grant's gazelle (*Nanger granti*), and impala (*Aepyceros melampus*). Another group of wild animal species appear to have increased, or remained at similar numbers, since 1977, including Burchell's zebra (*Equus quagga*), elephants (*Loxodonta africana*), and ostrich (*Struthio camelus*). Finally, some wild animal species are now only found in much smaller numbers than in 1977, such as Cape buffalo (*Syncerus caffer*), oryx (*Oryx beisa callotis*), warthog (*Phacochoerus africanus*), waterbuck (*Kobus ellipsiprymnus*), and wildebeest (*Connochaetes taurinus*).

Among livestock, there has been a steady decline in cattle and donkeys, but an increase in sheep and goats. It is likely that these findings are in part indicative of adaptations to cope with increased variability, as sheep and goats suffer lower mortality due to starvation and dehydration in droughts, and also recover more quickly after droughts. But this could equally be due to changing market demands, as well as a local desire for smaller but more stable cash sales each market day (R48).

Overall, these findings appear not too dissimilar to those of Ogutu et al. (2014) and Ogutu et al. (2016) who used the same data, to look at a Kenya wide scale, and at Kajiado county scale, respectively. However, important differences to both of these

[18]Black rhinoceros are reported to have existed at high densities in this area, within the lifetime of some of the elders I interviewed, one elder recounted climbing onto the roof of his house after a rhino charged him outside his home and exclaiming in shock: "look, there's a rhino right here" (I5).

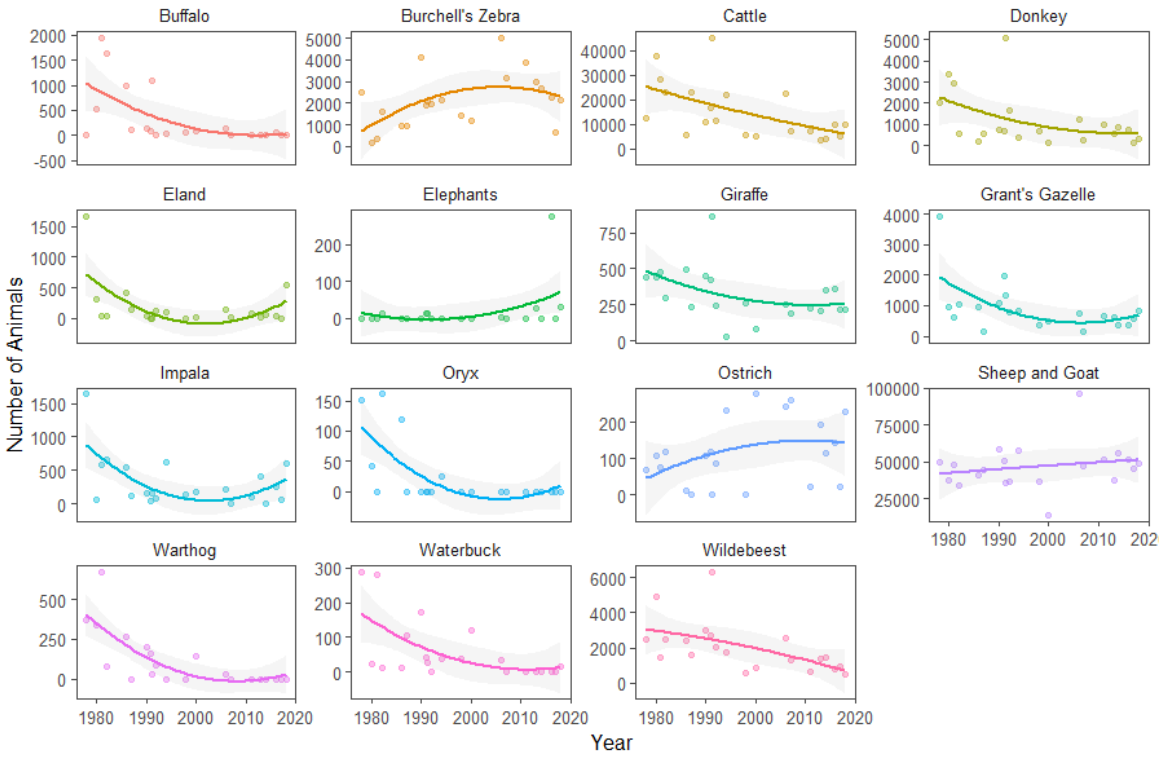


Figure 6.9 Changes in wild animals numbers, as well as cattle, donkeys, and sheep and goats, listed alphabetically, in the South Rift, as collected by DRSRS, from 1977 to 2019. The points shown are after the raw data were analysed to show animal population estimates with Jolly's method II (Jolly, 1969), and these were then fitted with a polynomial smooth and shaded standard errors to show trends over time.

studies are also evident. In contrast to the Kenya wide figures from Ogutu et al. (2016), some wild animals are increasing in number, and some are decreasing less rapidly, in Olkiramatian and Shompole GRs. The GRs also show less severe declines among most species, compared to results from Eastern and Western Kajiado presented in Ogutu et al. (2014). For example, in Amboseli, the 2009 drought resulted in a sharp decline in the numbers of most wild animals, particularly larger wild animals that depend on surface water (Veldhuis et al., 2019). However, this same effect was not seen in Olkiramatian and Shompole where several large wild animal species like elephants (*Loxodonta africana*) and Burchell's zebra (*Equus quagga*) have increased in number over recent decades. The increase in the number of elephants is surprising given the losses recorded in other parts of Kenya over recent years, largely from poaching and human-elephant conflict (Ogutu et al., 2016). This suggests that elephants have been

comparatively safe from poaching and retaliatory killing in this area, and that the area contains sufficient biomass and water to sustain them.

The trends shown in Figure 6.9 are reflected in responses from interviewees who commented that although most wild animals had decreased, others had increased: "they [wild animals] have changed because I remember when I was young you can just see wild animals everywhere but nowadays you just see some wild animals. There are now more on that side of the conservation, compared to other side [grazing area]" (I33).

Some interviewees also directly link more recent changes to the conservation areas: "Yes, since the conservation area started, the number of wild animals went up" (I38) and: "after we started the conservation the wild animals become more numerous, absolutely. We, Maasai, have stopped hunting ... so the wild animals have increased, on that side [conservation area]" (I23, also I11, I22, I27).

Although it would require rigorous research to verify this causative relationship, looking at Figure 6.9 it does appear that for several wild animal species, their numbers were decreasing up to the early 2000s when their numbers either stabilised (giraffe, Grant's gazelle) or increased (eland, elephants, impala). For many interviewees, there seems to be little doubt in their minds that the less rapid declines, and increases in wild animals is related to the fact that the illegal killing of wild animals is not tolerated as they are seen as important to eco-tourism (I23, I27, I33, I38).

As alluded to above in the results from HWC and attitudes towards wild animals, the opinions of people about the increases, are complicated. For example, one interviewee (I27) explains: "there were positives [from the conservation area] ... the wild animals increased in number, because they were no longer killed. But the negative is that they have started to finish the grass ... those zebras and wildebeest have become numerous and they have finished [the grass]."

6.5 The role of tourism in the governance and management of the conservation areas

Whereas in Chapter 5 my goal was to unpack the governance of natural resources at a broader scale, here I will focus more specifically on how these systems of governance play out in the conservation areas. The historical setting for the introduction of the conservation areas was explored in detail in Chapter 4. Once the GR decided to set aside conservation areas, and partner with eco-tourism lodge operators, the

management and governance of these areas changed. A recent review of the literature on eco-tourism and conservation by Stronza et al. (2019), found that many cases have resulted in economic, environmental, and social benefits. However, other recent research from East African rangelands by Bluwstein (2017) showed how two different models of eco-tourism can either reinforce local land-rights, or undermine land-rights and result in territorialised control over local resources. As I showed in Chapter 4, the people living in Olkiramatian and Shompole are neither inactive, nor homogeneous in how they interact with eco-tourism ventures, and some have very visibly demonstrated their agency in this sense. Therefore, any interpretation of the successes or failures of eco-tourism in Olkiramatian and Shompole must be careful. Nevertheless, I want to make the case that, based on their recent experiences, and the ways in which people view wild animals, human-wildlife conflict, and the ecological changes over recent decades, for now, eco-tourism and conservation remain secondary to the principal livelihoods of most people, pastoralism and irrigated cultivation (see Western et al., 2020).

As already fully described in Chapter 5, a mix of landscape governance institutions maintain a capillary like presence across this landscape. Governance of natural resources is adaptive and designed to maintain resilience of a desired social-ecological state (Carabine and Wilkinson, 2016). Land use and natural resource rules are impermanent and place based. Ongoing participation in the governance processes are key, with constant discussions, and reaffirmations that rules are still relevant. I concluded that unlike in other places (see Cavanagh et al., 2020), local governance institutions in the South Rift had not been superseded by externally driven land management to primarily conserve wild animals. So how does this fit in the context of eco-tourism in the conservation areas?

6.5.1 Rules and enforcement in the conservation area

In Chapter 5 I examined rules about settlement and grazing in the conservation area in detail, and showed that rules are flexible, but that changes are rapidly communicated, and occasionally sanctioned. It is therefore unsurprising that rules pertaining to the conservation area and wild animals in general are also flexible, and sometimes changed, and occasionally sanctioned.

Not long after the introduction of the conservation areas, local leaders repeatedly made it clear to outside stakeholders involved in conservation and brokering with

eco-tourism lodge operators, like the African Conservation Centre, that they wanted to make decisions themselves about rules in the conservation areas (I43; ACC/2003/5, ACC/2005/4). For example, they made it clear that the conservation areas would continue to be used as dry season grazing refuges, and the presence of eco-tourism wouldn't change this. Their livestock needed grass in the dry season, and as one conservation committee member describes "those white people [tourists] and those investors [lodge operators] who bring them, they don't eat grass" (I11).

There is nevertheless an acknowledgment that the presence of cows in the conservation area when tourists are out looking for wild animals can lead to conflict with the eco-tourism lodge operator (I7). The GR Conservation Subcommittees have therefore occasionally compromised to suit the eco-tourism lodges, with a verbal agreement: "if they [eco-tourism lodge operator] have tourists, they tell us, and we move livestock to the southern side [where tourists don't go]" (I11) or "when it is 5 [p.m.], the cows go back [home] ... you know it is at that time the tourists go out. Then from around 7 to 10 [a.m.], the cows won't go [to the conservation area] until the tourists go back [to the lodge]" (I39). However, the eco-tourism lodge operators are not always as understanding: "they came [to settle in the conservation area] two days ago and they shouldn't have, there is grass on the other side of the river" (I31)[19]. So although the community appears to be appeasing the lodge operators in the timing or location of their grazing, ultimately, they retain decision making about where they will graze, and when they move into the conservation area.

As well as grazing management, most members of the community have also altered their own practices when it comes to wild animals, such as: "reducing traditional lion hunts, not allowing herders to use dogs for hunting and chasing animals, and generally trying to more actively protect the wild animals, than possibly they did before" (I34). These are nuanced rules which mean that for instance, although lions hunts are to be "reduced", they do still occur (Western, 2018).

The unwritten rules which govern the use of the conservation area, and the treatment of wild animals in the area, are enforced primarily by community scouts, with occasional enforcement from the Kenya Wildlife Service (KWS) Rangers stationed in the area, when wild animals such as elephants (*Loxodonta africana*) and lions

[19]I should point out that the individual went on to say "they know all this, it's not like they need a [foreigner] to come and tell them, they know this" (I31).

(*Panthera leo*) are concerned[20]. I have already mentioned how the work of community scouts is influenced by local moral economies and how this also results in greater appeasement (see Chapter 5.10). There are several other potential conflicts of interests that community scouts have to navigate. They are responsible for monitoring and protecting the GR's conservation assets, yet: 1) they are paid with money from the tourist lodge operators, who know that their money is paying the scouts (I31); and 2) they are also supported (with some money for salaries, equipment, and technical assistance) with money from the South Rift Association of Land Owners (SORALO - a regional NGO) who therefore have a say in their work (I36, R48).

There is potential for these conflicts of interest to reveal themselves at a moment of crisis, although this has hitherto not occurred. This is probably partly because SORALO claim that they are "very much driven by the direction that the community want" and that they "allow the scouts to identify their own priorities and the issues they want to tackle, and facilitate that process" (I36). This is laudable and a reflection of what I found in the area. However, it remains unclear how this sits with the eco-tourism lodge operators who pay scout salaries and could demand greater enforcement of rules about grazing, or the illegal killing of wild animals.

Overall, I think it is not unreasonable to conclude that eco-tourism lodge operators do not dictate rules about the conservation area, although given my findings in Chapter 4, I acknowledge that local perceptions about this vary. The eco-tourism investors do, however, seek to negotiate management of the conservation area indirectly. Nevertheless, at the moment, it appears that the rules and their enforcement are once more about maintaining desirable social-ecological systems, by continuing to allow seasonal grazing in the conservation areas, or overlooking occasional killing of wild animals, even if this frustrates eco-tourism lodge operators, and continuing irrigated cultivation in the areas set aside for this. In so doing, people are ensuring that eco-tourism and

[20]As mentioned in Chapter 4, even outsiders, like the KWS Warden responsible for the area remarked that "it is very clear that they [conservation areas] belong to the community and that it was their decision to have them."

conservation remain secondary to people's principal livelihoods.

6.6 Understanding conservation areas from the perspective of household heads

Roe et al. (2010) and Schreckenberg et al. (2010) have convincingly argued that at the very least, conservation interventions should do no harm to people, but rather do good where possible. This is a worthy and achievable goal, however, as discussed in Chapter 1, the local, social outcomes of conservation interventions are variable, and several studies have noted that many conservation interventions have either no effect on the poorest households, or even undermine the ability of the poorest to cope (Amphlett, 2015; German et al., 2017; Martin, 2017; Upton et al., 2008). Indeed, research from across Maasailand in both Kenya and Tanzania has shown that the cost of conservation interventions, particularly in the form of protected areas, are most often borne by the poor (Brockington, 2002; Homewood et al., 2009b; Sachedina, 2008), and that even attempts at community-based conservation have little or no positive effect on poverty reduction (Bluwstein et al., 2016; Keane et al., 2019). Closer to the South Rift, Bedelian (2014) showed that in the Maasai Mara, different people benefited to differing extents in the process of setting up conservancies, with women and poorer community members benefiting the least.

Unequal distribution of benefits and costs can lead to disillusionment, potentially undermining efforts that the community have decided to implement. In this section I will examine how the way heads of households feel about the conservation areas has changed over time; how heads of households feel about wild animals living in their area; and the levels of human-wildlife conflict they face. I will also assess what factors help to explain these, with particular attention to wealth and spatial distributions.

6.6.1 Understanding support for the conservation areas

In Chapter 4 I showed that most household heads agreed with the decision to set up the conservation areas and agreed with the decision to have a conservation area at the moment (Table 6.2). I used logistic generalised linear models (GLMs) to understand more about the characteristics of the households who agreed or disagreed,

Table 6.2 Percentage of household heads who agreed with the decision to set up the conservation area, and percentage of household heads who agreed with the decision to have a conservation area at the moment.

	Olkiramatian		Shompole	
	Agreed	**95% CI**	**Agreed**	**95% CI**
Household heads agreed with the decision to set up the conservation area:	96.1%	93.4 - 98.8%	76.3%	71.5 - 81.1%
Household heads agreed with the decision to have a conservation area at the moment:	85.7%	80.7 - 90.7%	94.5%	91.8 - 97.2%

and importantly, to understand how this might be related to the Wealth Index of the household (Figure 6.10).

The base model in orange (Figure 6.10a) shows that household heads who have a higher Wealth Index at the moment, were more likely to express support for the creation of the conservation area, with an odds ratio of 1.65, SE = 0.12, $p<0.001$ (Table 6.3). The orange line in Figure 6.10b shows the predicted effect of this empirical relationship, with household heads more likely to express support for the creation of the conservation area when they have a higher Wealth Index. This probability decreases as the Wealth Index decreases. The adjusted model in blue (Figure 6.10), shows that even when other covariates were held constant, there was still a significant and positive effect from the Wealth Index, with an adjusted odds ratio of 1.48, SE = 0.10, $p<0.001$ (Table 6.3). The blue line in Figure 6.10b shows a similar effect to the base model in orange, although with larger standard errors.

The other significant covariates shown in Figure 6.10a and Table 6.3 indicate that if a household contained someone who held a position of leadership, the household head was more likely to have expressed support for the creation of the conservation area. Also, perceptions about wild animals showed predictable effects, that is to say that household heads who said they like wild animals were more likely to express support for the creation of the conservation area, compared to those whose views were neutral, while those who said they disliked wild animals were less likely to express support for the creation of the conservation area. However, these variables were not statistically

significant on their own in the adjusted model, but they were retained as they did improve the model overall (see model fit data in Table 6.3)[21].

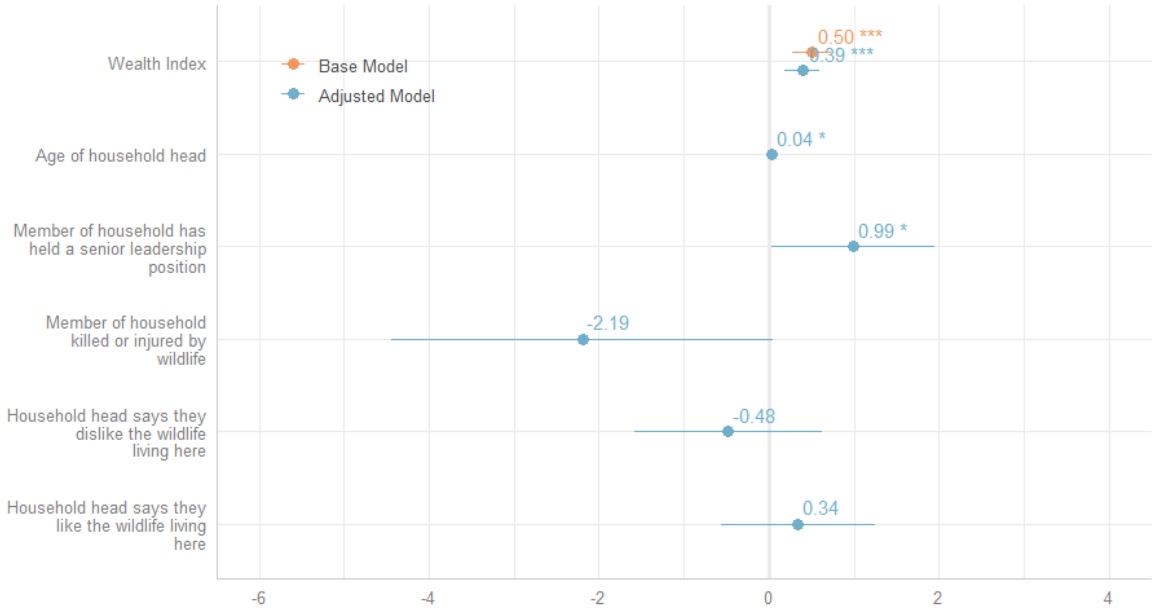
Table 6.3 Odds ratios and adjusted odds ratios for the logistic regression on whether the head of the household expressed support for the creation of the conservation area. Standard errors are shown in brackets, and statistical significance is indicated. Data on the model fit are shown at the bottom.

	Base Model Odds Ratio	**Adjusted Model Odds Ratio**
Wealth Index	1.65 (0.12)***	1.48 (0.10) ***
Age of household head		1.04 (0.01)*
Member of household has held a senior leadership position		2.70 (0.49)*
Member of household killed or injured by wild animals		0.11 (1.14)
Household head says they like the wild animals living here		1.41 (0.46)
Household head says they dislike the wild animals living here		0.62 (0.56)
Constant (Intercept)	7.19 (0.20)***	1.20 (0.64)
AIC	310	301
BIC	323	330
Cragg-Uhler Pseudo-R^2	0.03	0.05
McFadden Pseudo-R^2	0.08	0.14
Estimated dispersion parameter	1.11	1.05
N	368	368

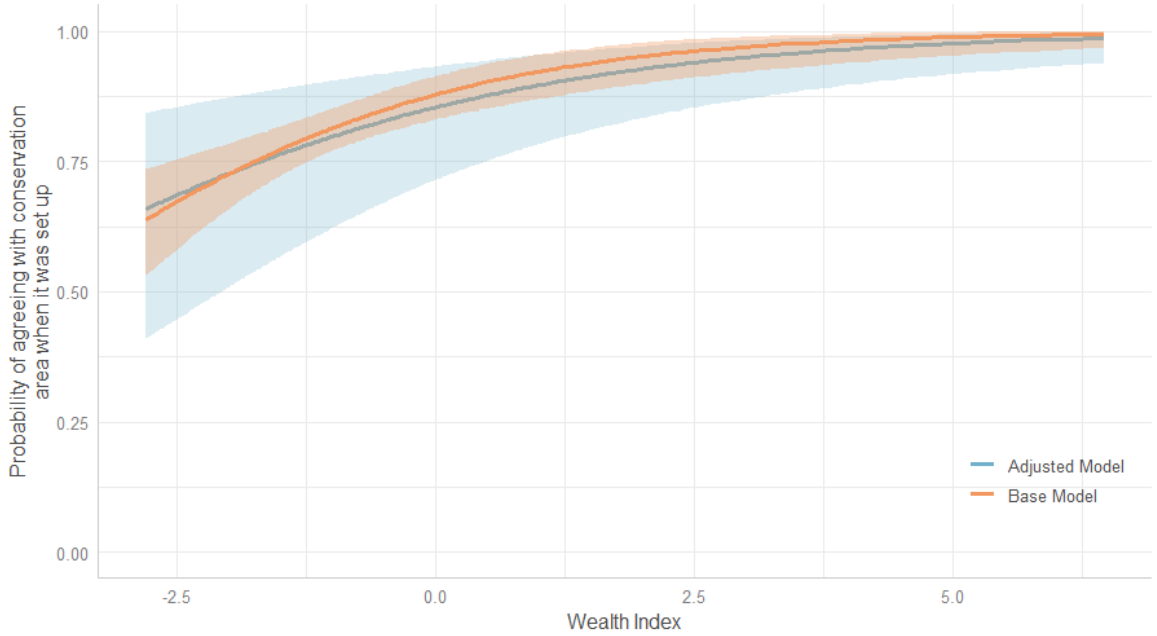
*** p <0.001; ** p <0.01; * p <0.05.

Household heads were then asked if they agreed with the decision to have a conservation area at the moment. The blue model in Figure 6.11 shows the effect of the Wealth Index on the probability of a household head expressing support for the creation of the conservation area has now reversed, with a weak but statistically significant effect in the adjusted model, with an adjusted odds ratio of 0.75, SE = 0.08, p<0.001 (Table 6.4). This suggests that households with a higher Wealth Index were slightly less likely to express support for having a conservation area today, when other covariates were held constant. The base model shown in orange, which does not include any other variables, also suggests households with a higher Wealth Index are

[21]It is important to note that all the covariates shown are based on the current situation of the household or current views of the household head and it is possible that either or both of these will have changed over time.



(a) A forest plot showing the logistic GLM coefficients (log of the odds ratios) on whether the head of the household expressed support for the creation of the conservation area. The base model which focuses on the empirical relationship with the Wealth Index is shown in orange, and the adjusted model is shown in blue. Standard errors bars and statistical significance are also indicated.



(b) A predictor effect plot based on the logistic GLMs, to show the predicted probability of expressing support for the creation of the conservation area, as it relates to the household's Wealth Index. The orange line represents the predicted effect from the base model, the blue line represents the predicted effect from the adjusted model, and the shading represents standard errors.

Figure 6.10 The factors related to whether the head of the household expressed support for the creation of the conservation area, with a base model in orange, and the adjusted model in blue.

slightly less likely to express support for having a conservation area today. However, the effect is weaker, and not statistically significant, with an odds ratio of 0.91, SE = 0.07, p>0.05 (Table 6.4).

Taken overall, the adjusted model, allows the conclusion that households with a higher Wealth Index, who are less likely to use the conservation area for grazing, and who don't feel sufficiently informed about the use of conservation money, are slightly less likely to express support for having a conservation area today.

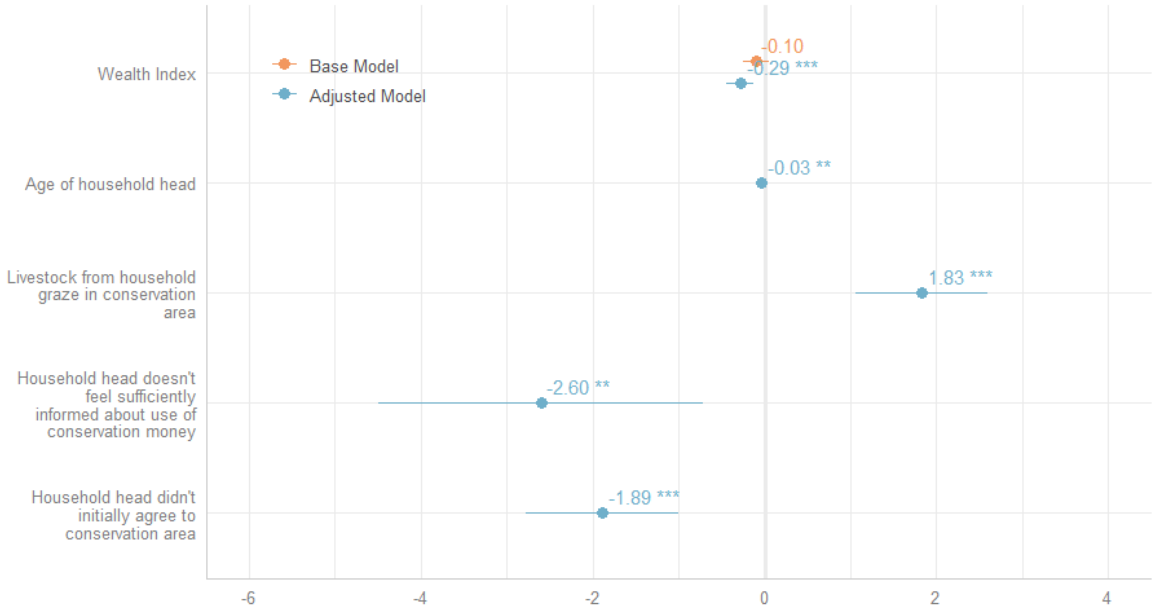
Table 6.4 Odds ratios and adjusted odds ratios for the logistic regression on whether the head of the household expressed support for having a conservation area today. Standard errors are shown in brackets, and statistical significance is indicated. Data on the model fit are shown at the bottom.

	Base Model Odds Ratio	**Adjusted Model Odds Ratio**
Wealth Index	0.91 (0.07)	0.75 (0.08)***
Age of household head		0.97 (0.01)**
Livestock from household graze in conservation area		6.21 (0.39)***
Household head doesn't feel sufficiently informed about use of conservation money		0.07 (0.97)**
Household head didn't initially agree to conservation area		0.15 (0.45)***
Constant (Intercept)	11.00 (0.17)***	224.16 (1.03)***
AIC	234	183
BIC	224	212
Cragg-Uhler Pseudo-R^2	0.00	0.15
McFadden Pseudo-R^2	0.01	0.25
Estimated dispersion parameter	1.00	1.25
N	405	405

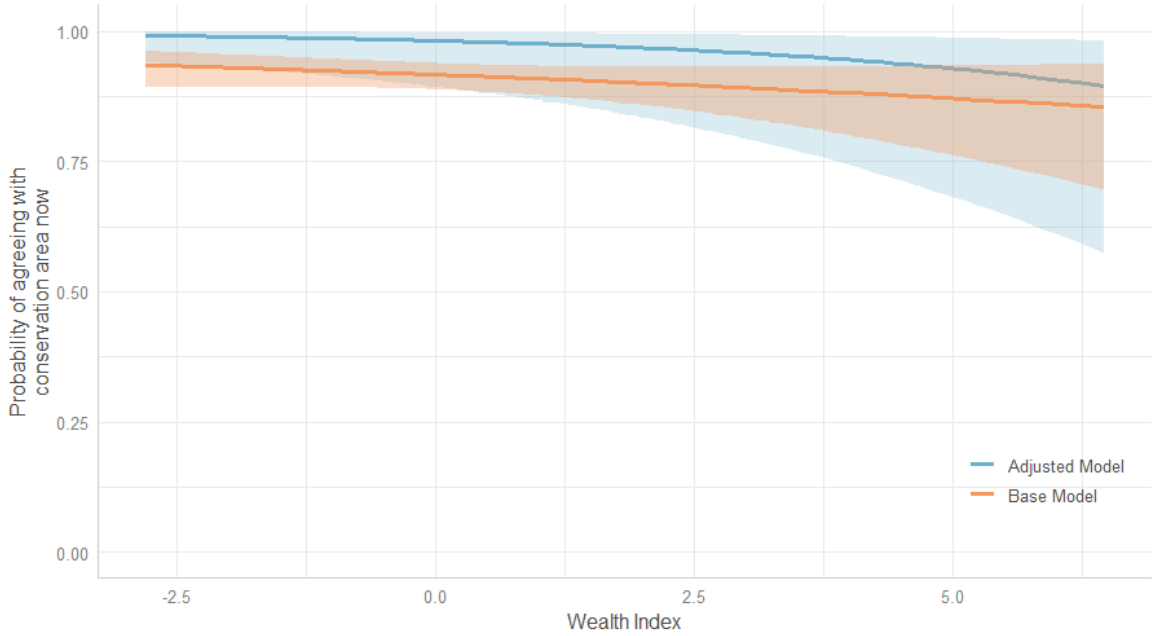
*** p <0.001; ** p <0.01; * p <0.05.

Why is it then that households with a lower Wealth Index, who were more likely to have disagreed with the decision to set up the conservation area, are now no longer more likely to disagree with having a conservation area today? A strong argument is that this has to do with the distribution of revenue and jobs, generated by the presence of eco-tourism, which is associated with the conservation areas.

As briefly mentioned in Chapters 4.8 and 5.2, several interviewees claimed that revenue generated from the conservation area is to be used in four main ways: education bursaries; support towards health costs or medical emergencies; building and



(a) A forest plot showing the logistic GLM coefficients (log of the odds ratios) on whether the head of the household expressed support for having a conservation area today. The base model which focuses on the empirical relationship with the Wealth Index is shown in orange, and the adjusted model is shown in blue. Standard errors bars and statistical significance are also indicated.



(b) A predictor effect plot based on the logistic GLMs, to show the predicted probability of expressing support for having a conservation area today, as it relates to the household's Wealth Index. The orange line represents the predicted effect from the base model, the blue line represents the predicted effect from the adjusted model, and the shading represents standard errors.

Figure 6.11 The factors related to whether the head of the household expressed support for having a conservation area today, with a base model in orange, and the adjusted model in blue.

maintaining water pipelines; building and maintaining communal buildings, like clinics (I3, I7, I23, I27, I33).

As an example, one interviewee (I38) describes how money handed over to Shompole in mid-2018 was used for school bursaries:

> "the money we got from [the eco-tourism lodge] ... all of that was used as bursaries. We got that money before the rains came, during the height of the drought, when it was difficult for people to afford to send their kids to school. You know the Maasai depend on their livestock, and the livestock were skinny, you couldn't tell who would be left with any livestock, even those who had 100, so how could they help their children to go to school?"

When they were asked to elaborate on who and how they chose who would receive bursaries, they explained:

> "[to choose] we called a meeting of the Group Ranch, the Conservation [Subcommittee] together with the *ilpayiani* [elders] ... and all the *nkraoni* [administrative chiefs]. We all sat down together and said today we are going to be giving bursaries out for 150 children, the first 100 must be from the most needy, so everyone calls them out by sub-location ... so that means 20 per sub-location [five sub-locations]... we said: this family don't have any livestock, they don't have this or that, and they have a child who is going to school, so we give them their children ... Then the rest, 50, there are those who are not the worst, but they are in the middle, you might find someone who can afford to pay the fees but are struggling to pay the fare for travel ... so the first 100 are for poorest and we give each of them KSh 15,000 each, and for the others we give them KSh 10,000" (I38).

The account of these events was also confirmed by other senior GR Management Committee members (I22, I23), as well as the eco-tourism lodge operator who was present at one such meeting.

Unlike school bursaries, contributions towards health costs or medical emergencies are normally granted on an as-needed basis. As an example, one interviewee shared that after their most recent receipt of money from the conservation area (for Olkiramatian this time): "we have an elder who is sick ... he is called [removed] ... it was KSh 30,000 for the medicine he was using, so we bought [it for] him" (I11). I contacted the elder with the help of my research assistant and confirmed this was true.

Furthermore, there is also clearly flexibility in how the money can be used. For example, a leader described:

> "a time when Olkiramatian was sold, in an auction ... because of a trespass on our land up on the mountain [decades previously]. The leaders of the conservation together with the GR and other people from Olkiramatian, held a meeting to discuss what was going on. At that time, the GR did not have money, and [the conservation money] rescued Olkiramatian that day ... [with the money] we paid a lawyer"

and they won a stay on the auction (I3, also I7, I11, I32; see Galaty (2011) for history about this legal dispute).

This sounds like it could be just rhetoric, but during my fieldwork from 2017 to 2018, aside from the data from my interviews, I saw significant evidence that indeed, school bursaries, support towards health costs, and some employment opportunities afforded by the conservation area are given preferentially to the households that are deemed some of the poorest (I2, I3, I11, I20, I22, I23, I33, I38, R48)[22]. This is one of the reasons why, when discussing the money that the conservation areas and wild animals brought in, I often heard variants of the quote "wildlife are other cows that help us."

That is not to say that this money is always well spent in what remains a somewhat neopatrimonial society (see Chapter 5.3 and results of Figure 6.11 and Table 6.4). Indeed, in researching precisely who received bursaries and jobs, I realised that those in positions of power ensured that their extended families and political allies also received some benefits, but my evidence suggested this was not entirely at the expense of the poorest households. Therefore, this could help explain why poorer households were positive about the conservation areas.

6.6.2 Making sense of human-wildlife conflict

A persistent, multi-dimensional, and dynamic cost for people living with wildlife, is human-wildlife conflict (Dickman and Hazzah, 2015; Redpath et al., 2013). Based on interview data, there are conflicting perceptions about the extent of human-wildlife conflict (HWC) from those involved in conservation in the area. For instance, one of

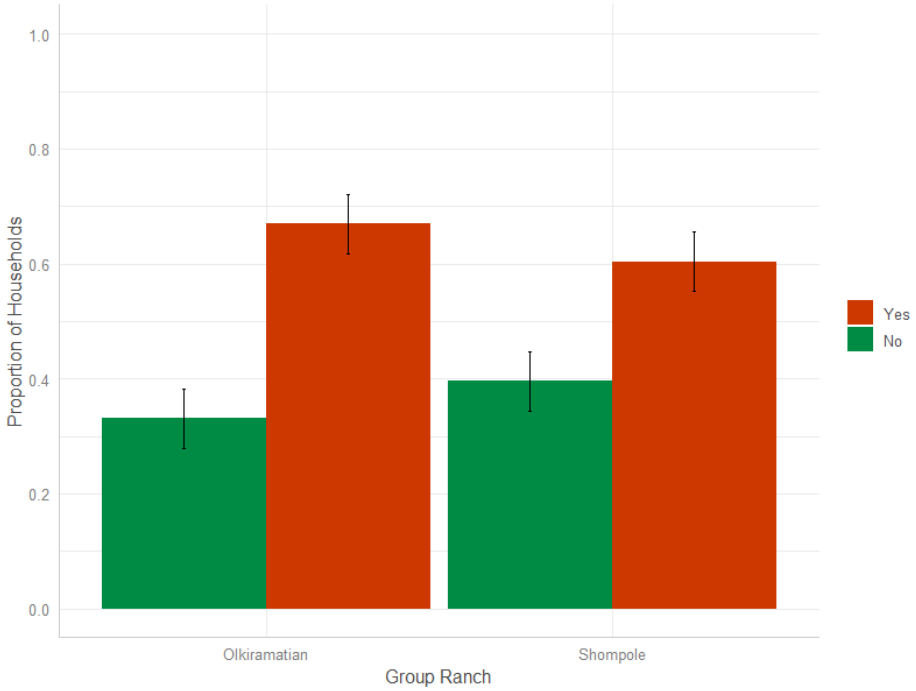
[22]I also took photos of the lists of bursary receiving families. I was able to contact a small number of these families who confirmed they received the bursaries.

the eco-tourism lodge operators living locally called the situation "unique" and were surprised about how few complaints they were aware of: "given you've got humans and wildlife living in very, very close proximity ... it is amazing how little HWC they do actually have, in terms of numbers, one would imagine that it would be higher" (I31), a view shared by others who work in HWC mitigation (e.g. I36). However, the senior government warden for the area claimed that "conflict levels are high, very high ... generally people are very well able to co-exist with wildlife, more so than in other places but ... [it's still] a very, very big problem" (I44).

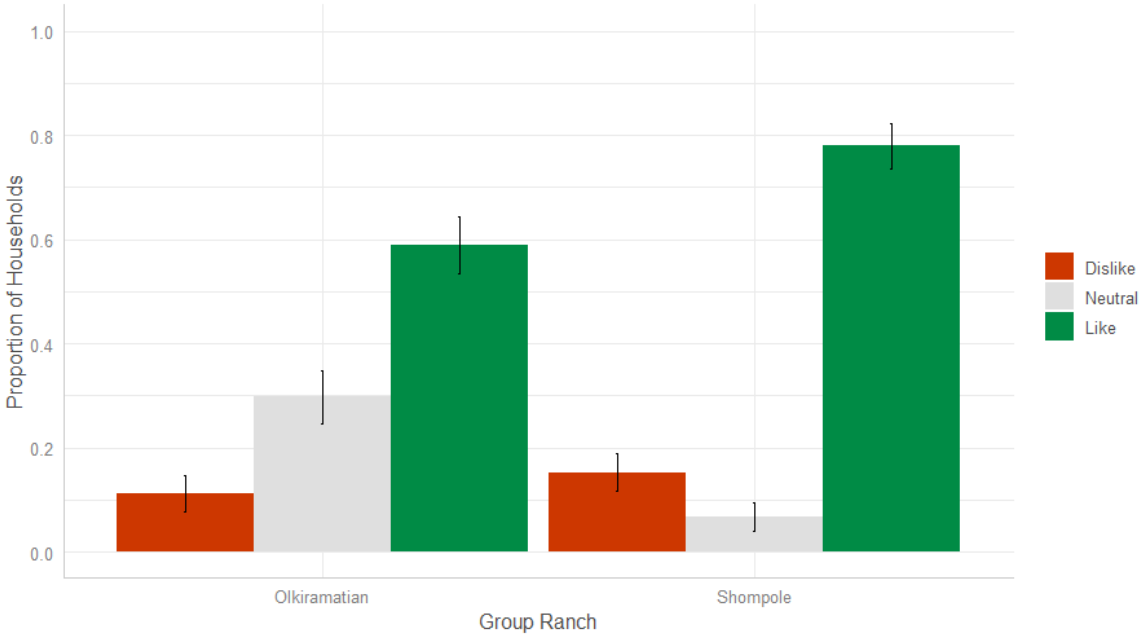
From the household survey data shown in Figure 6.12a, it is clear that a high proportion of households experienced some form of HWC in the last year. Most of the HWC incidents involved carnivores such as spotted hyaenas (*Crocuta crocuta*), lions (*Panthera leo*), and leopards (*Panthera pardus*) killing livestock; or olive baboons (*Papio anubis*), vervet monkeys (*Chlorocebus pygerythrus*), Cape buffalo (*Syncerus caffer*), elephants (*Loxodonta africana*), eating and destroying cultivated land. However, in Olkiramatian 6.5% of households (95% CI: 3.3-9.7) and in Shompole 1.2% of households (95% CI: 0.1-2.3) reported that a member of their household was injured or killed by wild animals in the last year. These serious cases deserve greater research attention, so for each reported case, we asked the interviewees if they would like to describe the incident. From those who were willing to provide further details, we learned that elephants, Cape buffalo, lions, hippopotamus (*Hippopotamus amphibius*), and leopards were responsible for injuring or killing people.

Figure 6.12b also shows that the majority of household heads in both Olkiramatian and Shompole responded that they either like, or feel neutral, towards wild animals living there. Given the level of reported HWC, these views are surprisingly positive, although there is likely to be variation between species, as found by Western et al. (2019), which was not accounted for here. To understand what factors might be related to whether a household experienced HWC in the last year, I began by using statistical models. The only significant findings from this were that 1) female household heads had fewer livestock, expressed as Tropical Livestock Units or TLU[23], killed by wild animals in the last year, and 2) that households who had a member in a senior leadership position had more livestock (as TLU) killed by wild animals in the last year. However, these effects disappeared when the correlation between the TLU owned by a household,

[23]Using Grandin's (1988) Livestock Units: Cow = 0.71 TLU, Sheep and Goat = 0.17 TLU.



(a) "Has your household experienced damage caused by wild animals to livestock, crops or people in the last year?"



(b) "How do you feel about the wild animals living here?"

Figure 6.12 Household survey responses when asked about human-wildlife conflict in the last year and feelings about wild animals. Error bars denote 95% confidence intervals.

and the TLU of livestock owned by the household killed in HWC was accounted for (Spearman's ρ 0.472, p<0.001)[24].

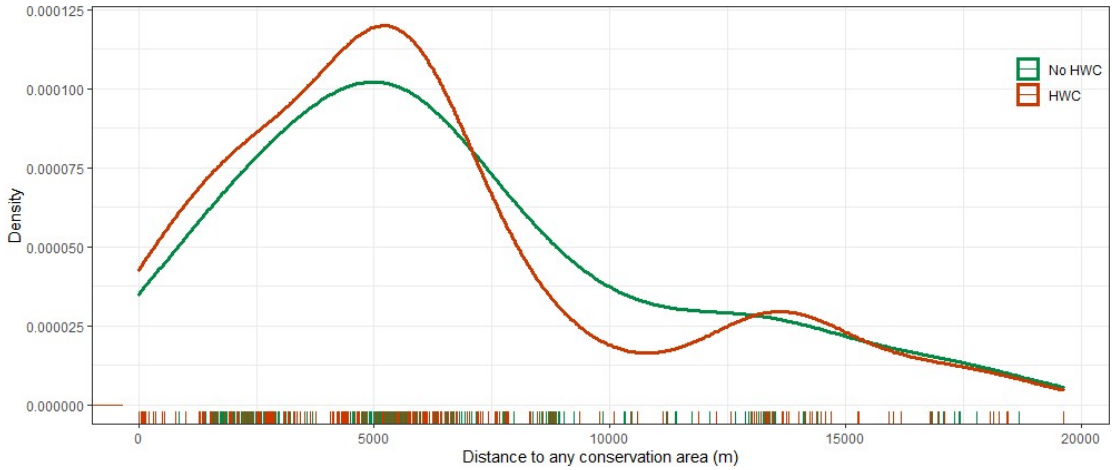
To understand if the factors related to HWC might be more complex, I created visual representations of the data. These were based on a kernel density estimation (an estimate of the probability density function) which took the survey design into consideration. Figure 6.13a shows a non-linear relationship, where more households within around 7000m from any conservation areas were likely to experience HWC. Beyond this threshold, fewer households experienced HWC, up to around 13000m.

Surprisingly, however, Figure 6.13b shows that this distance effect does not seem to hold when looking at the number of livestock lost to wild animals (as TLU). The median, 25% and 75% quantiles in Figure 6.13b suggests that households closer to any conservation area do not lose more livestock to HWC. This could be a result of wide-ranging mostly nocturnal wild carnivores that are not constrained to the conservation areas, but also found in other land use areas (Schuette, 2012; Western, 2018). Figure 6.13c also suggests that the relationship between the livestock lost in HWC and the distance from the conservation area is not explained by the Wealth Index of the household.

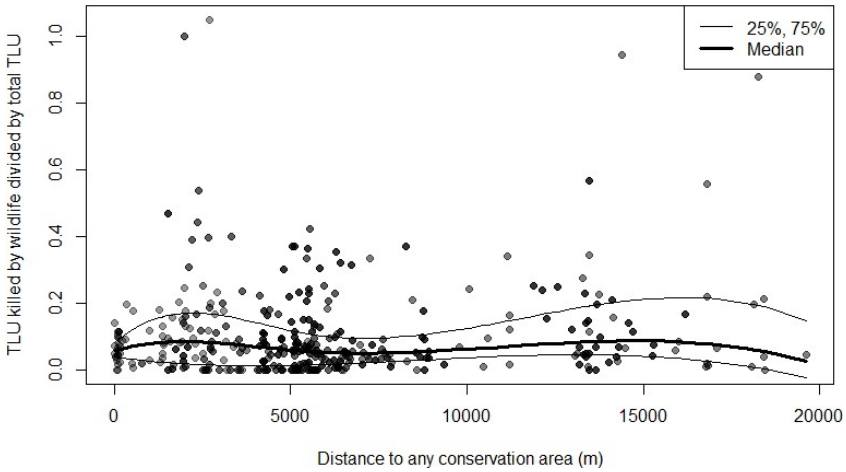
Overall, apart from the effect of distance to the conservation area, it is not easy to explain what led to reported levels of HWC. Moreover, it is hard to make sense of how the generally positive views about wild animals fit with the reported levels of HWC. People seem to be willing to continue to host wild animals on their land. Research has shown that perceptions about conservation are often heavily influenced by the local social context, and the historical narratives of conservation within a community (Western, 2018). In the South Rift, it is possible that part of this apparent contradiction could be because people accept and expect HWC as "normal." They have supported wild animal populations in the area for as long as they can remember, and therefore they have always experienced conflict.

This might help to explain cases like two interviewees (I40, I41) who had recently had cows killed by lions in unrelated incidents. One occurred while I was living in the person's *enkang'*, and the other a couple of weeks earlier, but about 30km away. Both herd owners cited something along the lines of "these things happen" and did not report that incident because there would have been too much hassle for a very small chance of receiving any form of compensation. The following story shows a similar

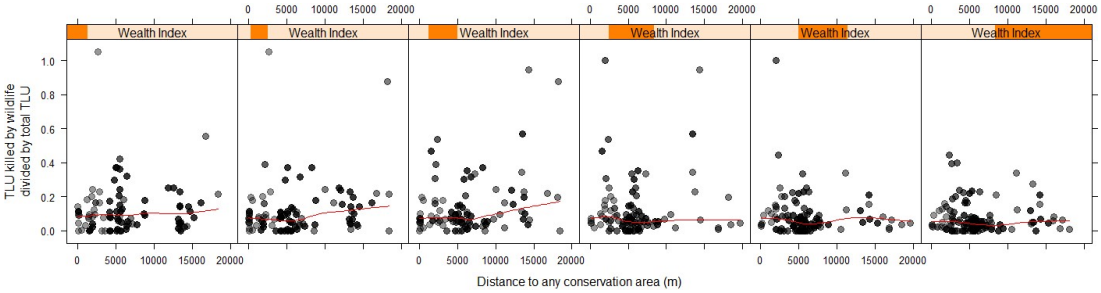
[24]This was standardised for proceeding analyses by dividing TLU killed by wild animals in the last year by current total TLU.



(a) The kernel density estimation (an estimate of the probability density function) of the relationship between whether a household experienced conflict with wild animals in the last year.



(b) How Tropical Livestock Units killed by wild animals varies with distance from either conservation area. The smooth curves are calculated with a quantile regression for each quantile curve. The shading of the points represent the weights used in the survey design.



(c) Investigating the effect of the Wealth Index of the household. Each panel has the same number of observations, and there is a 50% overlap between panels to smooth the relationship between panels, making it easier to identify trends, which can be seen with the red weighed mean smooth line. The shading of the points represent the weights used in the survey design.

Figure 6.13 Understanding the relationship between human-wildlife conflict, distance to conservation areas, and wealth.

attitude, where another interviewee (I11) retold: "my thoughts about wildlife, is that they are good, they belong to us" before later going on to tell me "I think that it would be good if the residents [near the conservation area] get money, if they are affected by wildlife" before explaining "if I give an example, I myself was attacked by a leopard[25], people took me to the hospital, and I haven't got any [compensation] up to now."[26].

Some people mentioned that previously, the lodge operator of Shompole Lodge used to pay compensation to those who lost livestock to carnivores in Shompole, which gave them the "morale not to kill [carnivores]" (I38). More recently, as set out in Kenya's Wildlife Conservation and Management Act 2013 (Government of Kenya, 2013), County Wildlife Conservation and Compensation Committee are supposed to pay compensation for loss or damage caused by wild animals. However, as the accounts above show, this rarely happens in practice at the moment.

6.7 Functions of the conservation areas in affecting resilience to drought

I now want to understand specifically the role the conservation areas play in affecting resilience to drought. In Chapter 4 I showed that the conservation areas have long been used as a dry season grazing refuge. However, I will now seek to examine whether the designation of these areas as conservation areas in the early 2000s has resulted in any changes to its use as a dry season grazing reserve, and whether other functions have disappeared or emerged.

6.7.1 Conservation areas and eco-tourism

As discussed above, eco-tourism is built on the notion that tourism can be used to enhance the livelihoods of local communities, whilst protecting biodiversity and ecosystem functions (Gössling, 1999; Stronza et al., 2019; Walpole and Leader-Williams, 2001). However, research on conservation and livelihoods from various locations across the rangelands of southern Kenya and northern Tanzania by Homewood et al. (2009b)

[25]With the scars they showed me to prove it!

[26]With events like this, some level of retaliatory killing is almost accepted, for instance, NGOs involved in conservation have said "retaliatory killing still takes place, mainly in response to human death or injury with some traditional hunts as well ... whether [this level of killing] is harmful to conservation in the long run is debatable" (I36).

show that livelihoods based on tourism cannot substitute for other natural resource based livelihoods, including pastoralism, or small holder irrigated cultivation.

To put this in perspective in the case of the South Rift, the weekly livestock market in Shompole generates approximately US $150,000 from livestock sales, based on a quick assessment I made after attending a weekly market with my research assistants and recording the number of animals sold (R48). This is not much less than the contribution of eco-tourism for a whole year, based on the data I had access to (Table 6.5). Therefore, in order to maximise rural livelihood incomes available to people living in the South Rift, eco-tourism must not undermine these livelihoods, including pastoralism, and irrigated cultivation outside of grazing areas.

Table 6.5 Income generated for the community from eco-tourism facilities in Olkiramatian and Shompole Group Ranches (GRs) in 2018, in KSh at 100 KSh = 1 US$. Data are based on signed lease agreements, reports from facility operators and managers, and scout managers. There are also other smaller sources of revenue from domestic camping fees paid directly to the GR Conservation Subcommittees. This is potentially an underestimate as one eco-tourism lodge operator claimed that in total in 2018 they contributed more than US $110,000 which is significantly more than shown below, but it was based on all the data made available to me. The letters ABC are used to maintain anonymity.

Eco-tourism facility:	**A**	**B**	**C**	**Community scouts**
Conservation fee (per adult, international)	4,000	3,600	2,000	
Conservation fee (per adult, domestic)	1,000	700	1,000	
Bed night fee (per adult, international)	2,000	2,000	1,000	
Bed night fee (per adult, domestic)	1,000	2,000	1,000	
Fees to increase over time?	Yes	Yes	NA	
Total in conservation fees for 2018	~750,000	1,220,000	962,600	
Total in bed night fees for 2018	~450,000	1,000,000	777,000	
Lease fees for 2018	330,750	1,215,506	NA	
Percentage yearly increase in lease fee	5%	~9.5%	NA	
Total area of leased lodge land (Acres)	295	1,250	NA	
Lease end year	2,037	2,027	NA	
Guaranteed minimum amount	Yes	NA	NA	
No. of full-time employees	3	22	17	13
No. of casuals	Variable	Variable	Variable	NA
Estimate of extras (casuals, boma visits, facilities hire, etc.)	~200,000	500,000	~120,000	
Total estimated minimum contribution for 2018 (fees, lease, salaries, etc.)	~3,500,000	~6,575,506	5,773,520	1,704,000
Total estimate for 2018 (from all sources)		**~17,553,026**		

As discussed in Section 6.6, aside from the small number of jobs created, the conservation area generates income through the payment of annual lease fees by the lodge operators, a bed night fee per guest per night, and a conservation fee per guest per night (see Table 6.5). As previously mentioned, according to members of the GR management committee and the GR conservation subcommittees, this income is supposed to be used in four main ways: education bursaries; support towards health costs or medical emergencies; building and maintaining water pipelines; building and maintaining communal buildings, like clinics and classrooms (I3, I7, I23, I27, I33).

Aside from the amounts of money made available through eco-tourism, what is also important is *when* the money is available, both for the community to use, but also to individual households who are either direct beneficiaries through employment, or indirect beneficiaries of the conservation areas. This can be particularly important during periods of drought, when livelihoods which are rain or water dependent, are constrained, and therefore items which require money, like school fees, become unaffordable[27].

According to the eco-tourism lodge operators in the South Rift, when asked about the impact of the 2017 drought on the revenue generated through visits from tourists, one lodge operator (I35) said; "the drought had no impact at all". Nevertheless, they acknowledged that other world events such as terrorist attacks, even in distant places, or global health pandemics, like COVID-19, can have severe effects (I31, I35).

Therefore overall, the eco-tourism lodges provide some additional revenue streams for the entire community, as well as employment opportunities for some households, which can continue through drought periods:

> "drought will be there even if the conservation [area] is there or not, but it makes things better, because some people are not as dependent on livestock. If we all just depended on livestock, I think we would have suffered a lot. But we have the conservation area and the money we get from it" (I33).

6.7.2 Conservation areas as dry season grazing refuges

In the past, households with livestock used the conservation area in dry seasons, as part of their usual mobility to access spatially and temporally variable forage. The introduction of the conservation area would, seemingly, have resulted in losing this

[27]For instance, one interviewee (I34) described how they noticed that school drop-out rates increase during droughts, and that sometimes "those children won't go back, that is the end of their education."

access. The conservation areas are indeed managed differently to other late dry-season grazing areas, with livestock access and settlement restrictions more stringently adhered to, and the killing of wild animals more actively prevented. Nevertheless, as discussed in Chapter 5, the conservation areas continue to be managed by local governance institutions, as essential dry season grazing reserves: "the conservation area helps during droughts because, that conservation area of ours, it is us who protect us, so that the livestock don't go in. When the grass is finished [elsewhere], we move our livestock back into the conservation" (I24).

Here, an interviewee from Shompole (I30, also I24) recalls how important the area was in the 2009 drought:

> "that [2009] drought was very long ... [but] the conservation area served as a conservation area for wild animals, and at the same time as a grazing reserve. You find that wild animals, there are some places where there is tall grass, and even the wild animals are afraid to go because they might be hunted by lions. So these areas remain with a lot of grass, and they helped. Even the cows from Matapato[28] when they moved here, they grazed in the conservation area. It was in our agreement [with the eco-tourism lodge operator] that during the dry season livestock are allowed, following our grazing patterns in the conservation area. This helped a lot."

Likewise, people in Olkiramatian also described how: "[the conservation area] is a good thing ... as a herder, it helps me ... when the drought is really bad, then there is a place where the cows can go to graze on the grass" (I7).

Outsiders, like the KWS Warden responsible for the outpost in the South Rift remarked: "that area [conservation area] is very important in droughts, and in this last drought in particular [2017] because people had set aside that area for grazing and then in the drought they moved in and their animals had grazing there."

6.7.3 Are the conservation areas making things better or worse during drought periods?

To answer this question, I asked household heads if, for their household: "Over the [2009/2017] drought, did the conservation area make things worse, make no difference,

[28] Ilmatapato, neighbouring *olosho* or section who asked for, and were granted, permission to graze in the conservation area in the 2009 drought.

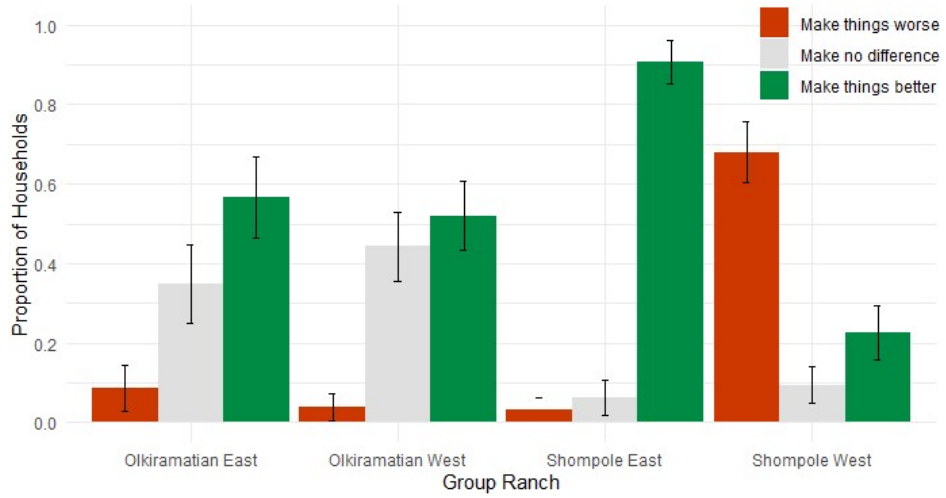
or make things better?" The answers from these questions are shown in Figure 6.14. Most household heads in Olkiramatian said they felt the conservation areas either made things better, or made no difference, over both the 2009 and 2017 droughts, with a slightly higher proportion of household heads saying that it made things better in 2017. Interestingly, whereas the vast majority of household heads in Shompole East felt the conservation area made things better over the 2009 drought, most household heads felt the conservation area made no difference over the 2017 drought. Most household heads in Shompole West felt the conservation areas made things worse over the 2009 and 2017 droughts, and more household heads felt the conservation area made no difference over the 2017 drought, compared to 2009.

I used logistic generalised linear models (GLMs) to understand what might be going on here during both the 2009 and 2017 droughts, and importantly, to understand how this might be related to the Wealth Index of the household. The base model in orange only looked at the relationship between whether the household head believed that the conservation area helped, or made no difference over either drought, and the Wealth Index of the household (for 2017 drought: Figure 6.15a; for 2009 drought: Figure 6.16a). The predicted probability of believing that the conservation area helped, or made no difference over either drought and how it related to the Wealth Index of the household is shown in Figures 6.15b (for 2017 drought) and 6.16b (or 2009 drought).

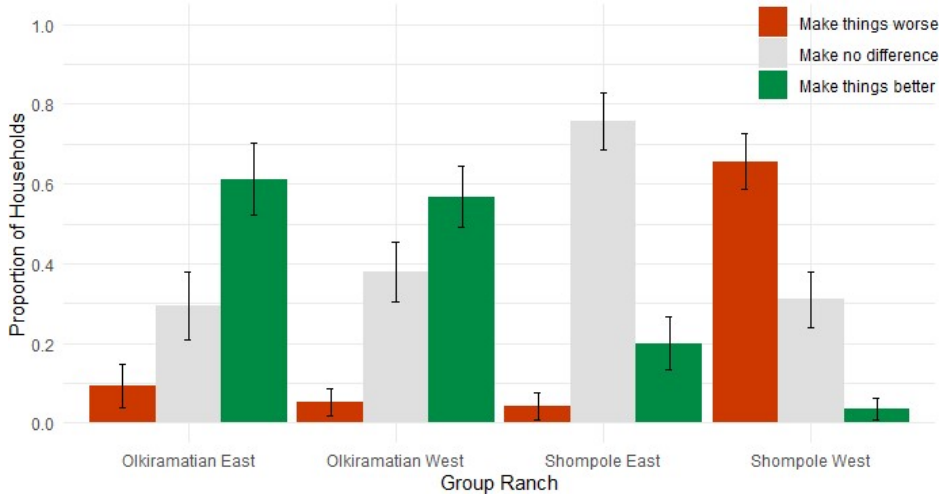
I also built adjusted models, and the forest plots in Figures 6.15a and 6.16a show that the same variables were statistically significant in each of the adjusted models for 2009 and 2017. However, the adjusted odds ratio values of these variables shown in Tables 6.6 and 6.7 do differ. Figure 6.13a shows that households closer to the conservation area experienced more HWC[29]. Therefore, those households which are further from the conservation area are perhaps unsurprisingly more likely to believe that the conservation area helped, or made no difference over both the 2009 and 2017 droughts. Likewise, households with livestock that graze in the conservation area are more likely to think the conservation areas made things better, as they have directly benefited from the fact that grazing in this area is preserved until the dry season, and grazing continues to be available into droughts, such as 2009 and 2017.

Both of these factors also help to explain why households who cultivated in the last year were less likely to think the conservation areas made things better, or made no difference over 2009 and 2017 droughts. Whilst it cannot be concluded for sure, it

[29]For clarity, previously I discussed only damage by wildlife in relation to livestock as TLU, here I now refer to damage by wildlife in relation to livestock, crops, and people.

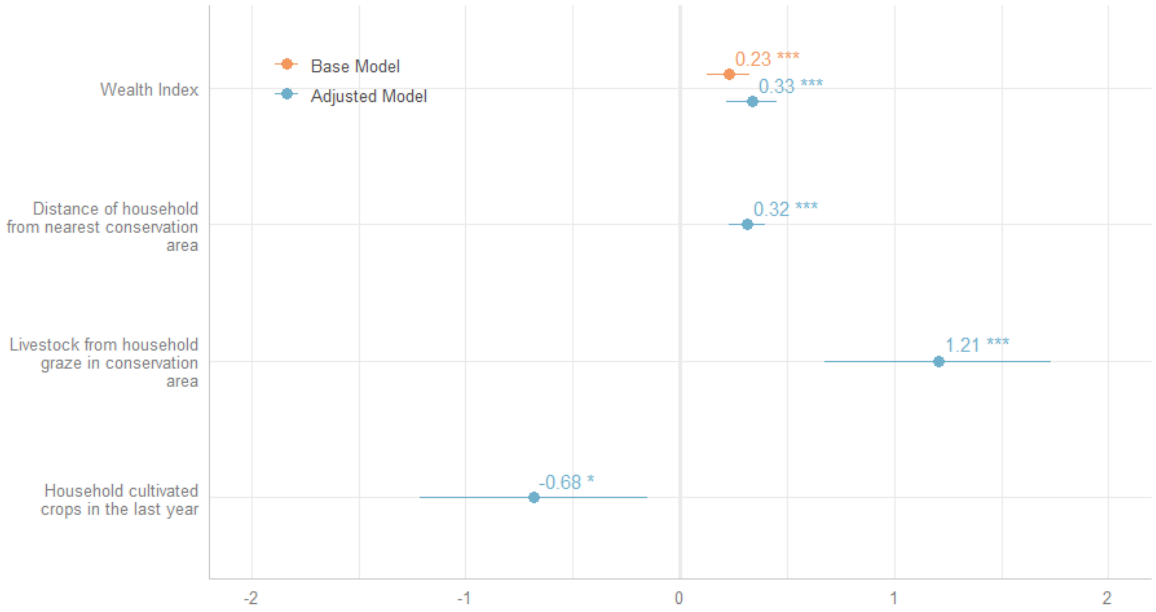


(a) "Over the 2009 drought did the conservation area make things worse, make no difference, make things better?"

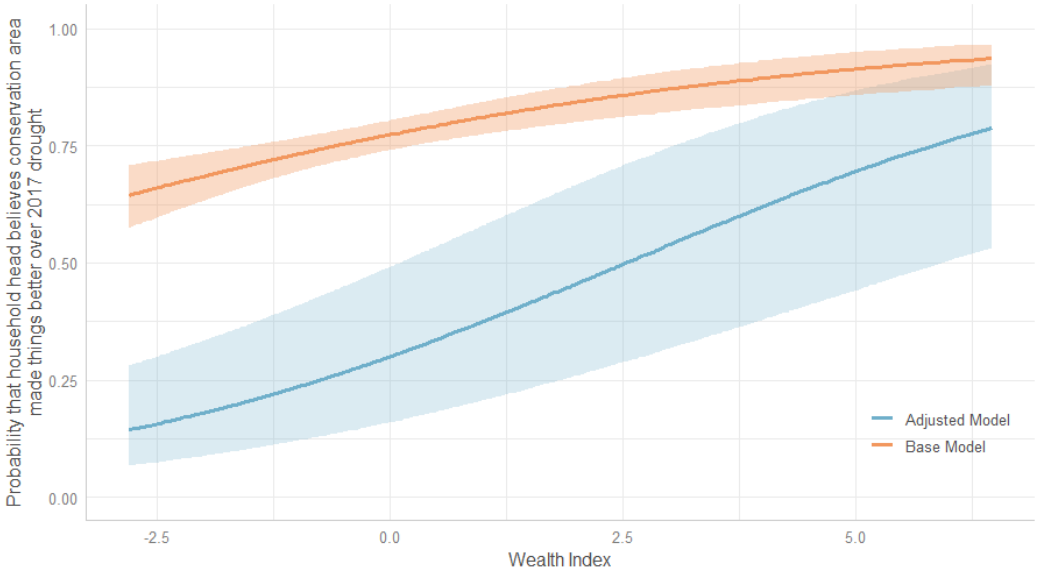


(b) "Over the 2017 drought did the conservation area make things worse, make no difference, make things better?"

Figure 6.14 Household survey responses when asked what difference the conservation areas made over the 2009 and 2017 droughts. Error bars denote 95% confidence intervals.



(a) A forest plot showing the logistic GLM coefficients (log of the odds ratios) on whether the head of the household believed that the conservation area helped, or made no difference in the 2017 drought. The base model which focuses on the empirical relationship with the Wealth Index is shown in orange, and the adjusted model is shown in blue. Standard errors bars and statistical significance are also indicated.



(b) A predictor effect plot based on the logistic GLMs, to show the predicted probability of believing that the conservation area helped, or made no difference in the 2017 drought, as it relates to the household's Wealth Index. The orange line represents the predicted effect from the base model, the blue line represents the predicted effect from the adjusted model, and the shading represents standard errors.

Figure 6.15 The factors related to whether the head of the household believed that the conservation area helped, or made no difference in the 2017 drought, with a base model in orange, and the adjusted model in blue.

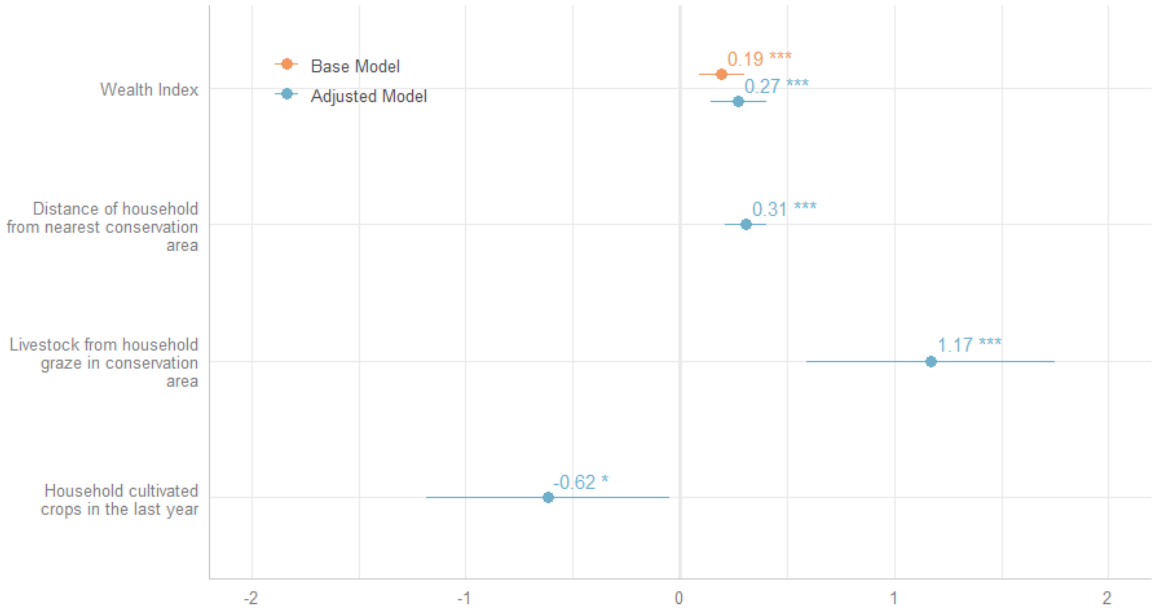
is likely that those who cultivate in areas near the conservation areas are susceptible to HWC. Looking at Figure 6.14 it is possible that this finding is particularly affected by the results from Shompole West, which includes the only areas where cultivation is permitted in Shompole. Interestingly this effect does not seem to exist in Olkiramatian West.

Further important conclusions can be drawn from comparing the 2009 and 2017 results in Figure 6.14. Firstly, in 2009 Olkiramatian did not have a successful eco-tourism facility that was providing jobs or generating revenue for the community. By 2017, Olkiramatian did have an eco-tourism facility that was generating revenue and jobs (Table 6.6). As Figure 6.14 shows, this could explain why a greater proportion of households felt that the conservation area had made things better over the 2017 drought.

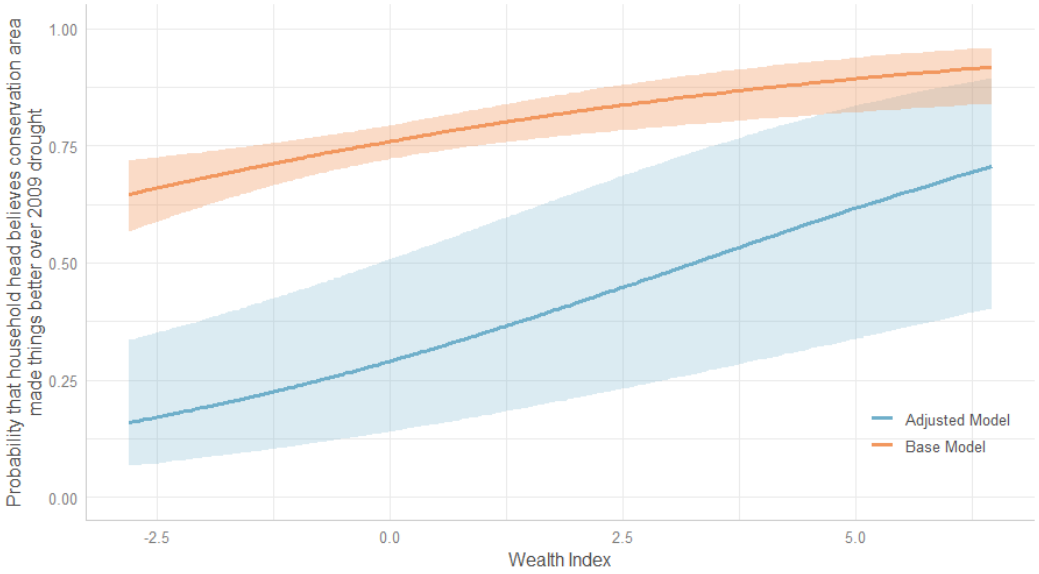
The opposite effect seems to have happened in Shompole, where an eco-tourism facility provided jobs and community revenue over the 2009 drought. Almost all households in Shompole East felt that the conservation area made things better, although not in Shompole West which represents the Shompole Cultivation Area (see Figure 3.3). As suggested above, higher levels of HWC closer to the conservation area, together with a lower likelihood that households in this cultivation area use the conservation area for grazing, might explain this difference. Shompole Lodge no longer existed over the 2017 drought, and a new, smaller eco-tourism facility had only recently started offering fewer jobs and much less community revenue. Now most households in Shompole East felt that the conservation area made no difference, a view summed up as follows: "there was no help [in 2017], because we didn't have a lodge, so we didn't have any money. We just went there, [and our livestock] would eat there and go back" (I23).

It is revealing to think about all these results, and the ways in which people say they used the conservation area in Shompole when there was no longer a lodge. Shompole Lodge precipitated the introduction of the conservation areas, but even after the lodge was deserted and eventually burned down, people still continued to regard the area as a conservation area, and used it as a dry season grazing reserve.

The fact that in the severe droughts investigated in this study, 2009 and 2017, the conservation areas continued their role as dry season and drought grazing refuges, under the control of local governance institutions, appears to be critical for maintaining resilient local livelihoods. As well as this, eco-tourism within the conservation areas generated revenue for the community and some employment opportunities, without



(a) A forest plot showing the logistic GLM coefficients (log of the odds ratios) on whether the head of the household believed that the conservation area helped, or made no difference in the 2009 drought. The base model which focuses on the empirical relationship with the Wealth Index is shown in orange, and the adjusted model is shown in blue. Standard error bars and statistical significance are also indicated.



(b) A predictor effect plot based on the logistic GLMs, to show the predicted probability of believing that the conservation area helped, or made no difference in the 2009 drought, as it relates to the household's Wealth Index. The orange line represents the predicted effect from the base model, the blue line represents the predicted effect from the adjusted model, and the shading represents standard errors.

Figure 6.16 The factors related to whether the head of the household believed that the conservation area helped, or made no difference in the 2009 drought, with a base model in orange, and the adjusted model in blue.

Table 6.6 Odds ratios and adjusted odds ratios for the logistic regression on whether the head of the household believed that the conservation area helped, or made no difference in the 2017 drought. Standard errors are shown in brackets, and statistical significance is indicated. Data on the model fit are shown at the bottom.

	Base Model Odds Ratio	**Adjusted Model Odds Ratio**
Wealth Index	1.25 (0.05)***	1.40 (0.06)***
Distance of household from nearest conservation area		1.37 (0.04)***
Livestock from household graze in conservation area		3.34 (0.27)***
Household cultivated crops in the last year		0.51 (0.27)*
Constant (Intercept)	3.42 (0.09)***	0.43 (0.42)*
AIC	532	437
BIC	517	460
Cragg-Uhler Pseudo-R^2	0.01	0.08
McFadden Pseudo-R^2	0.03	0.22
Estimated dispersion parameter	1.01	1.16
N	502	502

*** p <0.001; ** p <0.01; * p <0.05.

Table 6.7 Odds ratios and adjusted odds ratios for the logistic regression on whether the head of the household believed that the conservation area helped, or made no difference in the 2009 drought. Standard errors are shown in brackets, and statistical significance is indicated. Data on the model fit are shown at the bottom.

	Base Model Odds Ratio	**Adjusted Model Odds Ratio**
Wealth Index	1.21 (0.05)***	1.32 (0.07)***
Distance of household from nearest conservation area		1.36 (0.05)***
Livestock from household graze in conservation area		3.23 (0.30)***
Household cultivated crops in the last year		0.54 (0.29)*
Constant (Intercept)	3.15 (0.10)***	0.41 (0.47)*
AIC	448	373
BIC	437	395
Cragg-Uhler Pseudo-R^2	0.01	0.07
McFadden Pseudo-R^2	0.02	0.20
Estimated dispersion parameter	1.01	1.66
N	409	409

*** p <0.001; ** p <0.01; * p <0.05.

changing access to the conservation areas. This may not seem strange or unusual, but it is. For example, this is very different to the case in neighbouring Maasai Mara where conservancies have been formed by the pooling together of individual plot holders, and where grazing is predominantly controlled and restricted (I43; Butt, 2011; Bedelian, 2014; Cavanagh et al., 2020), and where no access to Maasai Mara National Reserve is permitted, officially at least. Likewise, this situation is also very different to other conservancies surrounding Amboseli National Park also in Kajiado County, where access to the park and its water are controlled and granted by the warden (Carabine, 2014; I43). Or indeed in Northern Kenya, where the power and control over the resources lies in different hands (Pas, 2018).

6.8 Conclusions

I sought to understand the overall changes in the South Rift social-ecological system with reference to the conservation areas, and whether these have changed social-ecological resilience to drought. The following is a summary of my findings, with the relevant points highlighted for each component of the social-ecological system.

In terms of the ecology of the area, it was unsurprising that changes occurred in land cover, vegetation productivity, and wild animal numbers over several decades. Land cover and vegetation productivity are unsurprisingly linked, and the biggest changes in vegetation productivity are directly linked to shifts in the route of the Ewaso Nyiro River and consequently the swamp and the closed woodland. Other areas, most notably the cultivation areas, have seen land cover changes and decreases in vegetation productivity. However, overall it can be concluded that habitat heterogeneity persists, albeit with changes over time in tandem with changes in land and water use. Importantly, differences in land management appear to be linked to the gradient of variation in forage biomass. Therefore, the current land management is maximising heterogeneity in herbaceous species composition and grazing resources (Fynn et al., 2016; Wang et al., 2006).

Some wild animals increased in number, some continue to decline, and some initially rapidly declined, before stabilising. The changes in wild animal numbers cannot easily be attributed to the conservation areas, although changes in some wild animal numbers appear to correspond with the years that the conservation areas were set up. However, in the minds of many local people, there is little doubt that these changes are linked to the conservation area.

In terms of governance, the conservation areas have long been used as dry season grazing refuges. Since the conservation areas were established, or "branded" as one interviewee (I1) called it, things changed. The community conservation areas now host eco-tourism lodge operators, who have built lodges in those areas, who have become important stakeholders, who provide a few employment opportunities, and who generate revenue for the community. Nevertheless, it appears that the eco-tourism lodge operators do not dictate rules about the use of the conservation areas, particularly when it comes to the grazing of livestock. However, as shown in Chapter 4, the power dynamics between different community members and the eco-tourism lodge operators mean that perceptions about the role of the lodge operators vary, and this can be ruinous.

At the household level, I found that heads of households were generally in favour of setting up the conservation areas, and that they maintain that support to the present day. Eco-tourism is regarded as an added benefit with little direct local intervention or opportunity cost, and it acts as another source of income which has been less affected by some local events like recent droughts. It appears that this has brought wealth and power to some households, provided education bursaries, employment opportunities, and therefore this may have helped households to cope during droughts when other livelihoods were constrained.

For instance, the lodge operators in the area noted that eco-tourism was little affected during recent droughts, although they are severely affected by even distant terror attacks, or health pandemics like Ebola or COVID-19. This has resulted in an interesting situation where poorer households were more likely to have disagreed with the decision to have a conservation area, but were no longer more likely to disagree with the decision to have a conservation area at the moment. This is most likely because the conservation areas' added eco-tourism revenue is seen to be beneficial to the community, and has reached poorer households, although not without benefits for those in power as well. Nevertheless, as discussed above, revenue from eco-tourism is unlikely to be able to substitute conservation for other natural resource-based livelihoods (Homewood et al., 2009c).

Also, most households in both Olkiramatian and Shompole do not feel that the conservation areas made things worse, even during recent severe droughts. When there are functioning eco-tourism lodges, most households feel that the conservation areas made things better. However, the exception was households in Shompole West, a cultivation area, where I suggest that higher levels of HWC and a lower likelihood

that households in this area use the conservation area for grazing might explain why household heads were more likely to respond that conservation areas made things worse during recent droughts.

Indeed, conservation of large and dangerous wild animals often comes at a cost, one that continues to be borne out at the very local scale in this social-ecological system, that of human-wildlife conflict. In general, household heads reported high levels of human-wildlife conflict, yet at the same time, their views about wild animals remain generally positive.

Furthermore, there is little doubt that there are trade-offs, complementarities, and conflicts between conservation and other rural livelihoods. As Upton et al. (2008) reminded us, our enthusiasm about the possibility of jointly achieving the goals of conservation and rural livelihoods should be tempered. Even when there are complementarities, land users must play a meaningful role in determining and negotiating the trade-offs in this process. In the South Rift, the balance between these trade-offs seems to shift slightly one way then the other, over time. For instance, based on what I found in Chapter 4 it appears that the initial eco-tourism models in Olkiramatian and Shompole were deemed unfair or unjust in one way or another.

However, based on the current situation as I encountered it in 2017, control and management of the conservation area remains in the hands of legitimate and effective local governance institutions, without the same level of restrictions to resource access as are encountered in many other supposed community-based conservation models, and without a historical legacy of having been forcefully removed from the conservation areas (Figure 4.3; Chapter 4).

Discussion

> *"Esuj erashe ng'ejuk emusana"* | "A new idea follows an old one," *sensu* if an idea is good, it is copied and followed.
>
> — Kipury (1983:199)

> When we try to pick out anything by itself, we find it hitched to everything else in the Universe.
>
> -— Muir (1911:110)

The principal aim of this thesis is to investigate the complex and important ways in which community conservation areas in Kenya's Southern Maasailand interplay with social and ecological resilience to drought. I sought to achieve this by answering the following research questions:

What is the historical context of droughts and conservation in the South Rift?

How are natural resources governed in the South Rift social-ecological system, which includes community conservation areas?

How have changes to each of the subsystems of the South Rift social-ecological system which includes community conservation areas, altered social-ecological resilience to drought?

In this concluding chapter I will emphasise the principal findings of each of the empirical chapters of the thesis, and synthesise these contributions to look at what

they mean more broadly. I also examine how the South Rift social-ecological system may be similar, or different to other contexts, and suggest avenues of important future research.

7.1 Principal findings and implications for our understandings of conservation and resilience to drought

In Chapter 4, I showed that the South Rift remained on the periphery of Kenya's protected area estate during the colonial, and post-colonial period. I also showed that the areas that are conservation areas today, have been treated differently, with regards to settlement and livestock grazing, and were important as drought grazing refuges, for at least several decades before the conservation areas were set up. The combination of these factors means that the spatial distribution of livelihoods, where people live, and grazing access to the conservation areas, have not significantly altered since the conservation areas were established.

The conservation areas are embedded in a working landscape, and they are not the spatial separation between people and wildlife that is often the outcome that conservation interventions seek to implement. Crucially, conservation is secondary to other economically and culturally important livelihoods and land uses (Western et al., 2020).

In Chapter 4 I also discussed some of the most significant, named, droughts in living memory in the South Rift, which still remain vivid in the mind of elders, and which played an important role in shifting policy debates about land tenure in Kenya's rangelands.

Finally, I found that there appear to be ongoing struggles between modernisation, and holding onto traditions, and for the most part, local people regularly returned to traditions and culture in the most critical of moments.

These findings set the historical context for Chapters 5 and 6. In Chapter 5 I showed that local institutions of natural resource governance, including traditional, modern, formal, and informal, combine in ways that allow them to achieve the governance trilemma of being considered legitimate, participatory, and effective for managing complex social and ecological systems (Folke et al., 2005). I provided details on the

function of the different local institutions of governance, how they work together, and how certain marginalised groups, like women, continue to be left out in this process.

To look at what this means in practice, I examined several case studies, where I showed processes of adaptive governance in how rules are changed, communicated, and sanctioned, particularly through social capital, and the moral economy (Herrera et al., 2014).

People in the South Rift draw on different governance institutions through a process of bricolage (Cleaver, 2012), in response to changing circumstances. In this way, various combinations of governance institutions are tailored to the geographic spaces, cultures, and histories of the South Rift. They are at once a balance between local governance institutions that offer greater legitimacy and participation, but which are ignorant of larger system forces that may be affecting them, and distant governance institutions, which are well linked to regional and national institutions, but are also often insensitive to local considerations (Brondizio et al., 2009). It appears that the current constitution of governance institutions, and the bricolage ways in which they are given authority, have resulted in systems which appear to be well suited to mediating complexity and uncertainty.

In their study on forest-based livelihoods and conservation in East Africa and South Asia, Persha et al. (2011) show that sustainable outcomes are more likely when local users participate in rule making, and vice versa. Persha et al. (2011) postulate that participation in rule making 1) provides an opportunity to contribute locally relevant information on resources and dynamics; 2) results in rules that are legitimate and better suited for local conditions; 3) helps to shift incentives structures so that natural resource users take decisions which balance priorities between activities which maintain good conditions over a long period, with those which provide important short term livelihood benefits. Based on findings from Chapter 5, and in the context of the thesis as a whole, I suggest that these processes are occurring in the South Rift social-ecological system.

Although I suggest that the South Rift is unlike many other rangelands with wildlife conservation in Kenya, where local natural resource governance institutions are superseded by externally driven land management institutions, in Chapter 4 I showed that there have been past contestations over these processes. Therefore, it is important to consider that the strengths of these shifting governance systems in adapting to change can also leave the door open for configurations of authority which

are susceptible to manipulation, or which create or reproduce inequality (Cleaver et al., 2013). These contestations for reconfigurations of power are ongoing.

Then, in Chapter 6, based on the social-ecological systems framework (see Figure 1.1), I looked at each of the different subsystems of the South Rift social-ecological systems to examine how the conservation areas were altering resilience to drought.

First, looking at the social subsystems, I showed that heads of households in both Olkiramatian and Shompole were generally in favour of setting up the conservation areas, and they maintain this support today. The conservation areas are branded as such because this is attractive to eco-tourism lodges operators and tourists, and the presence of tourism has resulted in income earning opportunities, and communal revenues which are used to support education bursaries, health emergencies, and other projects that the leadership prioritise.

Although it is commonplace that the opportunities eco-tourism partnerships afford are unevenly distributed in the community, here I found that poorer households were slightly more likely to have disagreed initially with the decision to establish the conservation areas. However, that this is no longer the case today, and they are now more likely to be in favour of the decision today. This suggests that some of the benefits of having a conservation area, including the partnerships with eco-tourism operators, has reached poorer households.

Furthermore, because droughts are local, they do not appear to affect tourism, and therefore the eco-tourism lodges continued to receive tourists, employ people, and pay fees to the community throughout these recent droughts, when other natural resource based livelihood opportunities were more constrained. I also show that most household heads do not feel that the conservation areas have made things worse, even during recent severe droughts. One exception was the majority of households in Shompole's cultivation area. I suggest that higher levels of human-wildlife conflict (HWC) together with a lower likelihood that households in this cultivation area use the conservation area for grazing might explain this difference. However, this deserves further research attention.

Indeed, in Chapter 6 I also showed that HWC imposed a significant cost for many households in the South Rift. Yet, surprisingly, the views of household heads remain generally positive about wild animals. This is hard to explain or interpret. However, I suggest that in the local cultural context with strong social capital, there is a belief that individual loss and sacrifice can be tolerated when there is some form of perceived

collective gain. It is also likely that given a long history of managing landscapes with wild animals, people do not perceive conflict with wild animals as different or unusual, and conflict does not appear to impact how people say they feel about wild animals. That is certainly *not* to say that this should be an acceptable cost, it is not. Conservation in any form must absolutely not come at the cost of harm to people (Martin, 2017) and it seems that preventing and mitigating these significant costs should be the focus of conservation efforts in this area.

Then looking at the ecological subsystems, I showed that there have been changes in land cover, vegetation productivity, and wild animals, over several decades. Land cover and vegetation productivity, as I measured them, were linked, but each showed different and relevant results. For instance, I showed that changes to the route and flow of the Ewaso Nyiro River and its associated swamp were directly causing significant changes in vegetation productivity. Over longer periods of time, this resulted in changes to land cover, particularly the formation or loss of swamp and closed woodland. I also showed that the cultivation areas have, unsurprisingly, seen significant changes in land cover and decreases in vegetation productivity.

As part of the ecological subsystem, an important finding was habitat heterogeneity persists through the current land management practices. The differences in land management areas appear to be linked to the gradient in forage biomass. This suggests that the current communal land management system, which includes late dry season and drought grazing areas, which are also "branded" and used as conservation areas, is maintaining mobility and maximising grazing resources for livestock, while also allowing wild animals mobility to access changing resources (Fynn et al., 2016). This could partly explain why, in the minds of people living in the area, and based on wild animal abundance data, increases in some wild animals, and slower declines in other wild animals, correspond with the years the conservation areas were agreed on. Thus, the people of this area manage open landscapes with mobile livestock and wild animals (Western et al., 2020), and have avoided the loss of livestock mobility seen in other places in southern Kenya's rangelands.

7.1.1 Contributions and implications

In this thesis I showed that currently in the South Rift, processes of adaptive governance draw upon different institutions through a process of bricolage. These effective, legitimate, and collaborative natural resource governance processes can allow people to

maintain resilience, or shape the trajectory of change when there are shocks, such as droughts, in their social-ecological system. They can also allow people to mitigate the effects of slower, longer term changes (Reid et al., 2014; Robinson and Berkes, 2010). Based on these findings, I argue that for community-based conservation to be effective, legitimate, collaborative, and suited to local conditions, existing governance institutions and processes which are functioning well, and which might include combinations of different governance institutions, need to be understood, and supported.

Indeed, as I showed in the South Rift, local governance institutions are capable and well-suited to successfully manage and conserve their natural resources, including wild animals, without undermining other locally important livelihoods. At the same time, this is only possible when national and international policies and legislation enable people to hold onto secure land tenure, and defends their rights to self-organise and use the resources on their land. Unfortunately, this is still rarely the case and more needs to be done to prevent external actors and policies undermining the resilience of local social-ecological systems.

This thesis also supports findings from other parts of Maasailand with community-based conservation (Homewood et al., 2009c), that in pastoral rangelands, the economic benefits of conservation are often small, but that pastoral production systems remain as vital, resilient, livelihoods for most households. Based on the findings in this thesis, I therefore reiterate that a tenet of community-based conservation approaches in communal rangelands should be to acknowledge that conservation must not supersede or undermine local livelihoods but instead, help people to maintain rights to manage their own rangelands and natural resources (Reid et al., 2014; Western et al., 2020).

Finally, in this thesis I demonstrated the importance of understanding the historical, cultural, and ecological context of social-ecological systems before further research can be usefully analysed. I recommend that future similar research does the same.

Reflecting on my research approach, I would argue that using a social-ecological systems perspective with a resilience lens in this thesis was invaluable in facilitating interdisciplinary research which used methods from different schools of thought. By using and combining different methods which can often be hard to integrate, I have learned a tremendous amount about the possibilities, as well as the limitations, of these methods, and the broader research approach.

Interestingly, the process of using this research approach also revealed that even when there were significant ecological changes happening in the South Rift, such as

droughts, or a shifting river course, or changes in vegetation productivity, or changes in wildlife numbers, many of the most notable findings presented above focussed on how people and management systems responded to these changes. This suggests that other research approaches which focus on these aspects, with some aspects of ecology, such as political ecology approaches, could provide other insights, particularly with regards to processes of marginalisation, and political-economic forces at higher scales (Blaikie, 1985; Blaikie and Brookfield, 1987). For instance, other research which used a resilience lens in a pastoral setting, such as that of Watson et al. (2016) or Homewood et al. (2019) found that a resilience framework did not produce new insights that other frameworks, such as political ecology, might bring to light.

Overall, however, I believe the aforementioned research findings I have brought into focus, demonstrate that using this research approach can be fruitful.

7.2 Caution: assessing uniqueness

When reflecting on the contributions and implications of this thesis, we must be cognisant that by delving into significant depth in one social-ecological system, it is harder to draw comparisons and generalities about social-ecological resilience in different contexts, and to different events (Carpenter et al., 2001; Walker et al., 2006).

If we try to understand what might be regarded as somewhat unusual in the South Rift social-ecological system, we would see for instance that although this area is predominantly a semi-arid rangeland, it also has a perennial river and swamp. The area also has a relatively unique topography, with a large rift escarpment and several hills or mountains in the area, each associated with their different forms of vegetation. Several smaller streams run off the escarpment, and these make irrigated cultivation a potentially productive livelihood option. Furthermore, the heat, dust, and relatively remote location make this area difficult to reach, down a dead-end road. This also means that it remains distant in the minds of most people, and markets, even though it is not a great distance from Nairobi.

One difference between the South Rift and many other community conservation areas, is that this area is not close to a state protected area, which would have its own governance systems, and with whom local governance institutions would therefore have to work with, or against, as the local context dictates. It also appears that there are high levels of trust, including institutional trust, that grows out of a strong moral

economy and social capital, which are reinforced through the perceived legitimacy, participatory nature, and effectiveness of local governance institutions.

There are already many other conservation area models in Kenya which do not follow the template I have outlined. To contrast the situation in the South Rift, we can look to two other relatively nearby areas in Maasailand, both less than 100km away, with community conservation areas, Maasai Mara and Amboseli. In both of these cases, there is a state protected area (Maasai Mara National Reserve and Amboseli National Park). Yet, in both places, the state protected areas are relatively small, and wild animals move well beyond protected area boundaries into surrounding privately owned land, some of which comprises community conservancies in different forms. Both areas are significant revenue earners for government agencies, including county and national levels, respectively.

In the lands surrounding both protected areas there are many more lodges, camps, tourists, and therefore revenues from tourism, than in the South Rift. The significant revenue generated from wildlife tourism in these areas renders wildlife conservation a for-profit business for some members of the community, including tourism business owners, some wildlife conservation agencies, as well as other stakeholders (Cavanagh et al., 2020; Mbaria and Ogada, 2016). However, questions remain whether these revenues only reach the better placed, and opportunistic minority elites, as opposed to the vast majority of local households (Bedelian, 2014; BurnSilver, 2009).

In Amboseli, the Ol Tukai swamps and surrounding areas served as critical sources of water and grazing for people, livestock, and wild animals, in extreme droughts (Western, 1982). Since the establishment of Amboseli National Park, the Ol Tukai swamps now lie within the park, and access to them is now controlled and granted by the warden of the national park (Carabine, 2014). In the Maasai Mara, some dry season and drought grazing reserves now lie within the protected area (Butt, 2011), and so, livestock grazing into the reserve continues, precariously, at night-time (ibid.). These cases are both different to the South Rift, where access to the dry season and drought grazing reserves in the conservation areas, as well as access to the Ewaso Nyiro swamp, are controlled by local governance institutions.

Furthermore, the situation I encountered in the South Rift has little bearing on Kenya's large, private conservancies found in places like Laikipia.

Therefore, as the points made above should attest, attempts to generalise beyond this social-ecological system should include a degree of caution, given the important

influence of context, locality and history (Upton et al., 2008).

7.3 Many paths and future directions

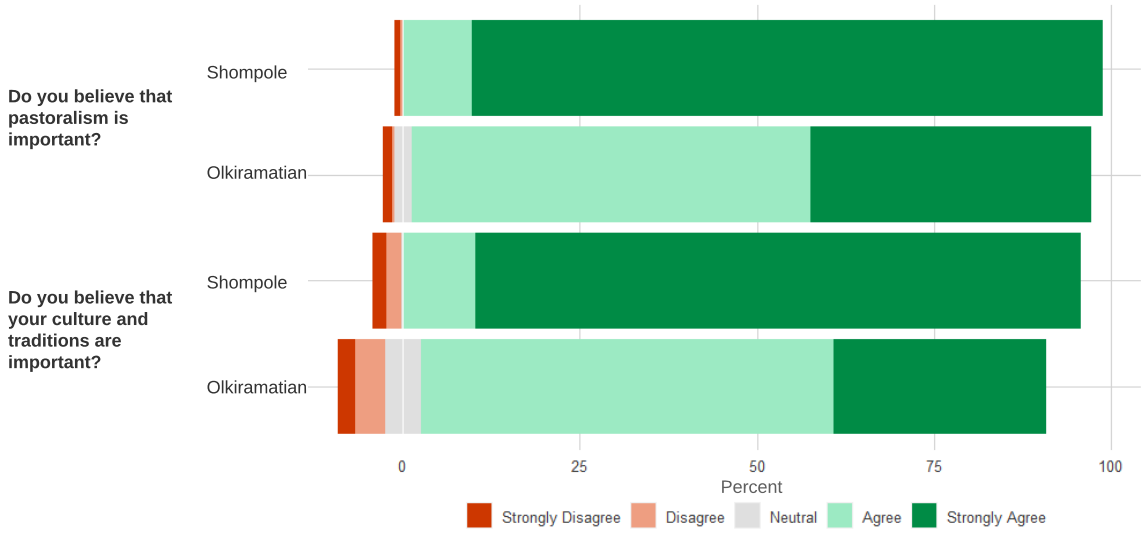
As a final couple of questions in my household survey, I asked household heads if they believe that pastoralism, and their culture and traditions, were important. I then asked them whether they felt optimistic or pessimistic about the future of pastoralism, and their culture and traditions (shown in Figure 7.1).

Figure 7.1 shows that although the vast majority of household heads value their culture, traditions, and the pastoral way of life, household heads are predominantly pessimistic about the future. Here, I will offer a short account about why that might be the case.

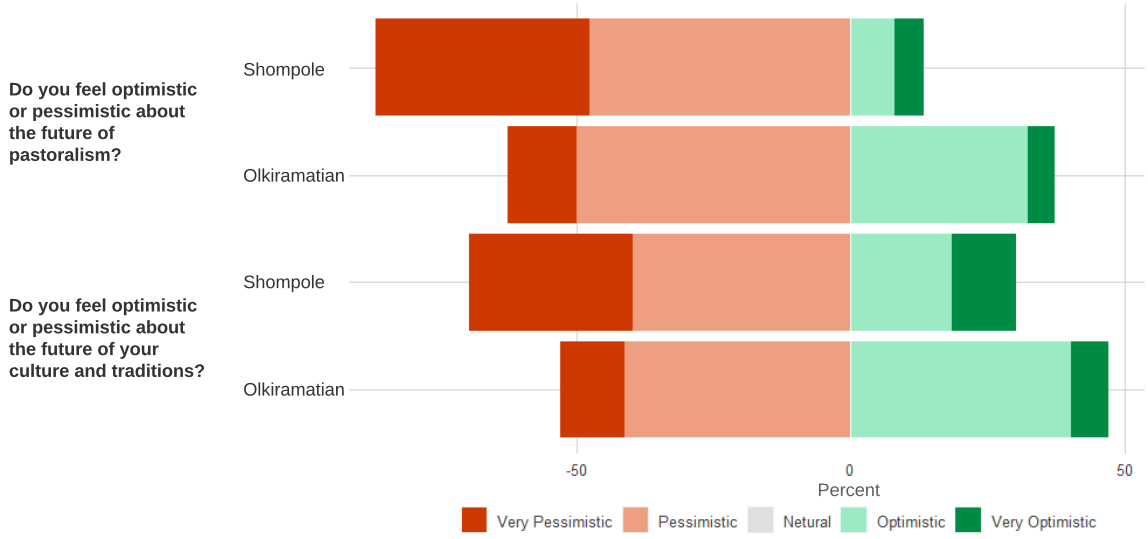
7.3.1 Maintaining local social-ecological resilience

In this thesis I show that currently, local adaptive governance can effectively operate to maintain the resilience of the local social-ecological system in a desirable state. People living in these areas have an enduring capacity to assimilate new elements and adapt to change (Berntsen, 1976; Spear and Waller, 1993). Indeed, indigenous management and conservation of lands plays a critical and overlooked role in global conservation (Garnett et al., 2018). Recognising and supporting existing institutions, and rights to land, as well as sharing the benefits accrued from the management and conservation of these lands, is key for future conservation success. But of course, different people value social-ecological systems in different states, and so decisions about whether to maintain the resilience of social-ecological systems in particular states are inherently political.

Furthermore, social and ecological changes are simultaneously occurring at scales beyond which this local social-ecological system can realistically affect. Changing slow variables from social-ecological systems at other scales are especially challenging to control or manage. These include: policy changes; livelihood diversification; neoliberal forces of market capitalisation in the South Rift's capitalist frontier (Moore, 2015); cultural shifts; and the changing climate of East Africa's arid and semi-arid lands (Williams and Funk, 2011). Each of these is playing a steady but pressing role in



(a) Responses from household heads in Olkiramatian and Shompole on their current beliefs about the importance of pastoralism, and their culture and traditions.



(b) Responses from household heads in Olkiramatian and Shompole on whether they feel optimistic or pessimistic about the future of pastoralism, and their culture and traditions.

Figure 7.1 Household survey responses when asked about pastoralism, and their culture and traditions.

altering the South Rift social-ecological system in ways which will recast local resilience.

7.3.2 Changes ahead: new land laws, subdivision, and diversification

In the South Rift, the Land (Group Representative) Act of June 1968 (Government of Kenya, 1968) has dictated land tenure laws for over 50 years. However, as discussed in Chapters 3 and 5, the Community Land Act (Government of Kenya, 2016) means that community members of these Group Ranches now have to go through yet another arduous bureaucratic process to register theirs as "Community Land."

Many people in leadership positions in the South Rift reported that there has been very little awareness about this new Act, and what it will mean for them. As suggested in Chapter 5, the extent to which norms and cultural values ingrained in the current institutions of governance, centred around the Group Ranch, will be carried over, remains unclear. Although the new Act does have its strengths (Wily, 2018), the current incertitude about potential new loopholes need to be addressed so that people are not, once more, at risk of losing their land. For instance, given their past experiences, community members are inherently uneasy about the fact that county governments now hold Group Ranch titles in trust until they transition to community land (Galaty, 2011).

Another potential change ahead for communities in the South Rift, is that of land subdivision. This issue has come to dominate GR politics in most other southern Kenyan GRs for several decades (Mwangi, 2007a). Indeed, most other GRs have either already been subdivided, or have plans to, including, most recently, Olgulului/Lolarrashi Group Ranch in Amboseli. It may soon be the case that the South Rift will be the only communally owned rangelands of southern Kenya; how long will they realistically remain so? Each change or transformation is political, and often inequitable, with winners and losers (Davies et al., 2015). Elites from within and without often position themselves to exploit opportunities or ambiguities, whereas those marginalised by their culture, ethnicity, gender, or wealth, are often excluded.

Furthermore, although pastoral production systems are likely to remain a resilient, robust, and vital component of modern livelihoods in Maasailand for some time, changes in education, market integration, changing sensibilities, and a growing population mean that livelihood diversification is almost inevitable (Homewood et al., 2009c; Sandford,

2006). The implications of this in terms of social-ecological resilience to drought in arid and semi-arid lands are likely to be complex, and deserve future research attention. This is particularly concerning given that increasing sea temperatures in the Indian Ocean have resulted in an increase in below average rainfall years in many parts of East Africa (Williams and Funk, 2011).

The implications of livelihood diversification on spatial forms of community-based conservation, as opportunity costs change, also deserves greater research attention. What happens to key wetland drought refugia for livestock and wildlife? What happens if these wetlands in dry lands become predominantly for intensive cultivation, completely excluding livestock and wildlife, as has happened in other parts of Southern Kenya?

Finally, the constantly changing context of capitalism is an oft-ignored process in social-ecological systems research (Nadasdy, 2007). In particular, the flow of money and commodities are constantly disturbing, maintaining, or creating social-ecological systems, for capitalism (Harvey, 1993). These evolving dynamics certainly deserve greater research attention.

For instance, to what extent are current conservation efforts escorting capital and capitalism into the South Rift social-ecological system (Brockington et al., 2008)? Or, how have the historic, and current social and ecological impacts of the capitalist production system of the powerful Magadi Soda Company altered the South Rift social-ecological system? Aside from Magadi Soda Company's controversial history with regards to their current land holding (see Hughes, 2008 for a detailed overview of this), I refer here to two findings mentioned in Chapter 4.7: the Magadi Soda Company's significant tree felling operations from 1934 to 1949 which removed over 190,799,000 kgs of wood from the ecosystem (Hill, 1964), as well as their ongoing abstraction of water from the streams which flow off the Nguruman escarpment (a total of 2.7 million litres is abstracted per day, by the Magadi Soda Company; KI/U/1).

To what extent would these social-ecological disturbances support Marx's assertion that "capitalist production ... simultaneously [undermines] the original sources of all wealth - the soil and the worker" or indeed that "capitalist production ... disturbs the metabolic interaction between man and the earth" (Marx, 2015:637-38). Although these issues are well beyond the scope and aims of this thesis, further research to

answer these important questions is necessary.

7.3.3 Conservation as dispossession by ecological success

Finally, I wanted to briefly address one pressing issue when it comes to community-based conservation in the South Rift. Conservation interventions can often be processes of spatial exclusion and territorialisation (Bluwstein, 2018), which can be particularly constraining and unjust in dynamic arid and semi-arid areas, where shocks such as droughts too, are spatial in their impacts. Unfortunately, as I have mentioned elsewhere in this thesis, there is the distinct possibility that a resilient social-ecological system, managed and used by local people, can be taken away from them, for the purpose of conservation. This could either be through direct land dispossession, as occurred throughout the 20th century (Adams, 2004), or indirectly, in the sense of "disciplining local people to exclude themselves from their own land" (Igoe and Croucher, 2007:538), at a significant cost to themselves.

Nelson et al. (2012) argue that over recent years there has been a trend in East Africa towards a re-consolidation of central authority over natural resources, and a consequent subverting of existing local rights and claims. Based on precedent, particularly in East Africa, there is without doubt a future risk of land dispossession in the name of conservation. Although detailed information about the consequences of evictions for the sake of conservation remains underexplored for Kenya (Hughes, 2007), there is a rich literature on these issues in East Africa's rangelands (Bluwstein, 2018; Brockington, 1999; Cavanagh et al., 2020; Ykhanbai et al., 2014).

For instance, in the South Rift, potential future changes in tourism territorialities could result in tourism operators colluding with corrupt leadership to appropriate communal land solely for tourism (as Bluwstein (2017) showed in Tanzanian Maasailand). Or, should the national government declare that because of the high density of wild animals, this area would now be set aside as a protected area for the economic or ecological benefit of the nation, such as a National Park. Successful community-based conservation would then, once more, effectively become dispossession by ecological "success". As in other cases, such drastic changes in the South Rift social-ecological system would disproportionately affect those already marginalised by their culture, ethnicity, gender, or wealth, whilst at the same time provide opportunities for the

wealthy, or distant elites.

7.4 In closing

It seems that, as was pointed out in the foreword to *Staying Maasai* (Homewood et al., 2009b), in East Africa's rangelands, the most innovative conservation programmes are emerging in the areas where there are no parks, where conservation is a matter of choice, not obligation: the case for the South Rift. Perhaps what is fundamentally interesting about this case is that this does not seem to be what Duffy (2000) calls conservation as depoliticized scientific rhetoric. That is, trying to escape the complex ethical and political considerations that are at the heart of conservation as a spatial practice, a conflict which puts conservation in conflict with other land and resources uses. Instead, this appears to be an example of natural resource management continuing fundamentally unchanged, with the conservation area providing other forms of revenue, which are resistant to some of the shocks that can affect rural livelihoods.

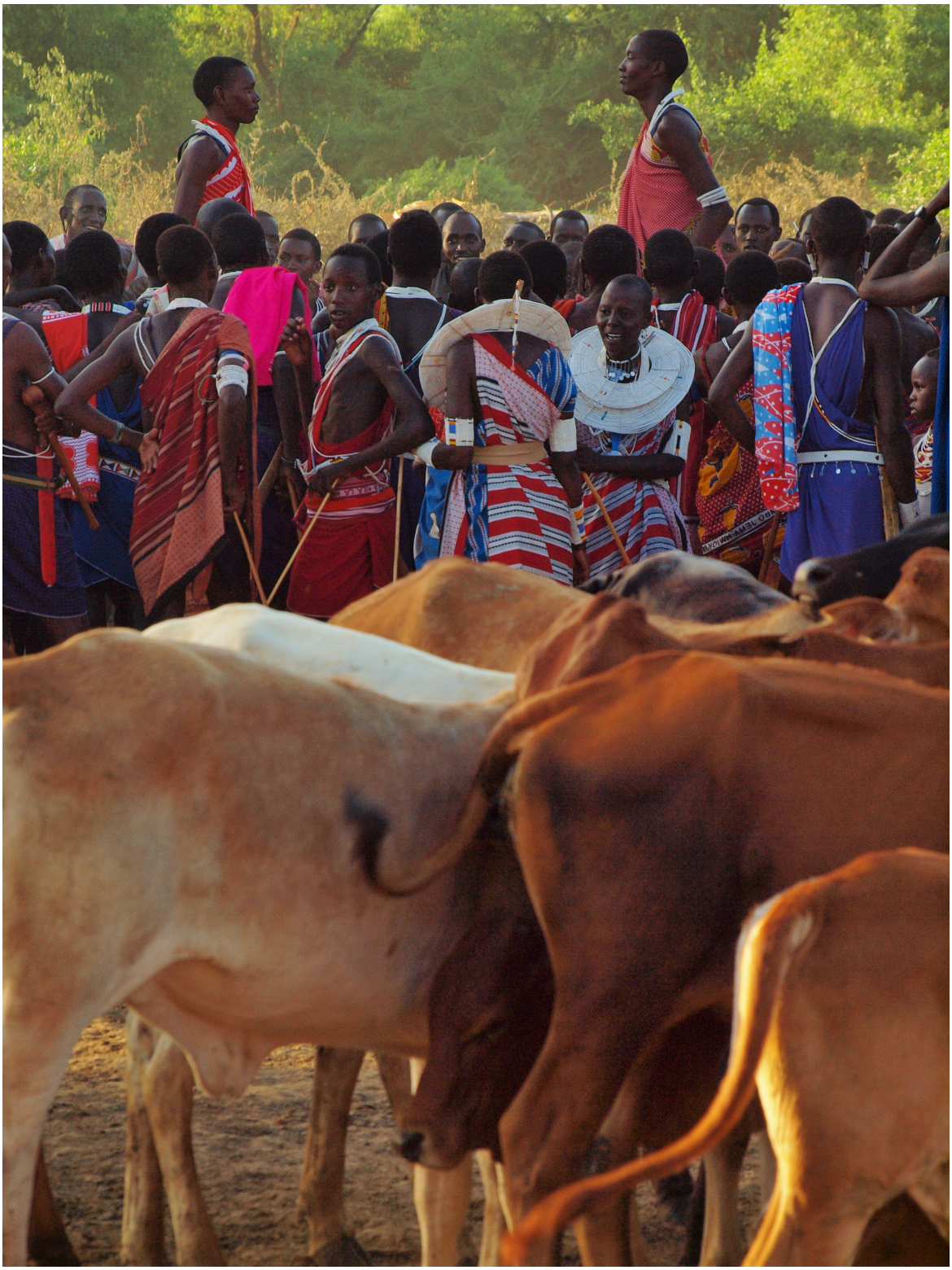
Perhaps conservation areas, where control and management remains in the hands of legitimate and effective local governance institutions, with flexible restrictions to resources access, and without a historical legacy of exclusion for conservation, could offer potential? Before jumping to such conclusions, it is necessary to remain cautious, particularly when looking to the fate of other institutions in Kenyan Maasailand. Galaty (1980:169) was optimistic about the future of the GR in Kenyan Maasailand, which he saw as a system that "represent[s] a positive innovation precisely because of its limitation, for in the cracks and crevices of its organisation, Maasai may be able to make it work - through their own system. What it promises them is the security and time to generate innovations appropriate to their needs..." However, Galaty's pragmatic optimism could not foresee the fall of the GR at the hands of wealth grabbing (Mwangi, 2003). A similar fate could lie ahead for conservation areas too.

Where community-based conservation has failed, it is often not because of its basic conceptual premise, but because implementation is being manipulated for the means and goals of powerful actors, and making things worse for most local people (Brockington, 2002; Sachedina, 2008). Without wanting to sound sanctimonious, it appears for now that the South Rift presents a different case. Based on the situation as I encountered it in the South Rift, control and management of natural resources remains in the hands of governance institutions which are considered legitimate, participatory,

and effective, and which aim to maintain a resilient social-ecological system in their contextually desirable state.

The areas that are "branded" and used conservation areas today, continue to act as late dry season and drought grazing refugia, while partnerships with eco-tourism operators provide some additional revenue to some people, as well some communal revenue. This is achieved without the same level of restrictions to resource access encountered in many other community-based conservation models, and without a historical legacy of people being forcefully removed from the conservation areas. Although this revenue cannot substitute for other economically and culturally significant natural resource-based livelihoods, it does appear to be less affected by recent droughts, which did have significant effects on natural resource-based livelihoods.

With the luxury of hindsight, we can now look back to when Campbell (1993:270) suggested that "for the majority of Maasai the future is bleak" and Péron (1995:231) in Brockington (2002:143) imagined that Maasai "will become landless and end up ... caught in a poverty trap. A sad prospect for a proud people." We can see that for my study area, these calamitous predictions thankfully remain, for the most part, incorrect. The people of Maasailand have faced significant trials and tribulations. No doubt there are of course future incertitudes still to come. However, as this thesis suggests, the people of Maasailand are not doomed. Instead, I am pragmatically optimistic that when actions at larger scales do not overpower their own abilities, the people of Maasailand can not only adapt to the challenges and changes that they face, they can continue to be a proud people who maintain what they hold valuable, even through adversity.



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Appendix A Precipitation and Enhanced Vegetation Index over time

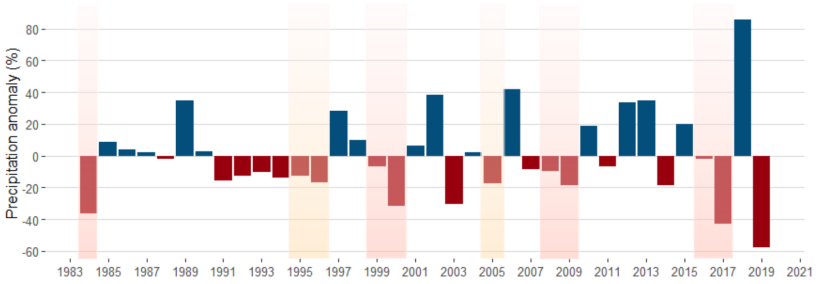

Figure A.1 Percentage anomaly of yearly precipitation for Olkiramatian and Shompole from 1984 to 2019. Red boxes indicate severe drought years based on interviews. Note the build up to 2009-2010, and the build up to 2017-2018. Data are from Climate Hazards Group InfraRed Precipitation with Station data.

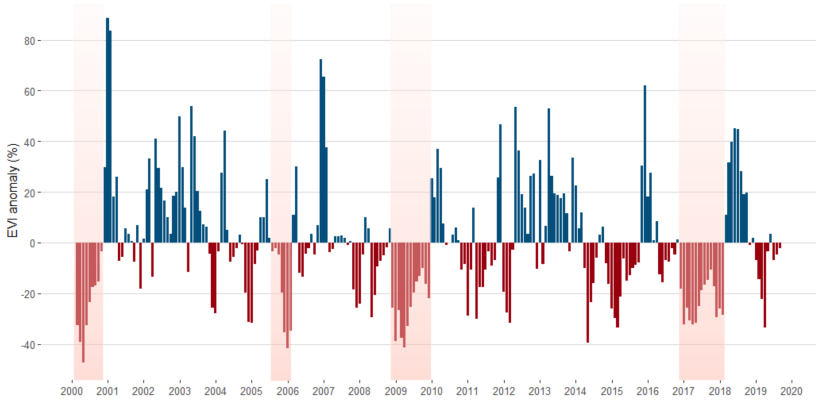

Figure A.2 Percentage anomaly of monthly Enhanced Vegetation Index for Olkiramatian and Shompole from 1984 to 2019. Red boxes indicate severe drought years based on interviews. Note the build up to 2009-2010, and the build up to 2018 when heavy rains started. Data are from MODIS' Terra EVI 16-Day product.

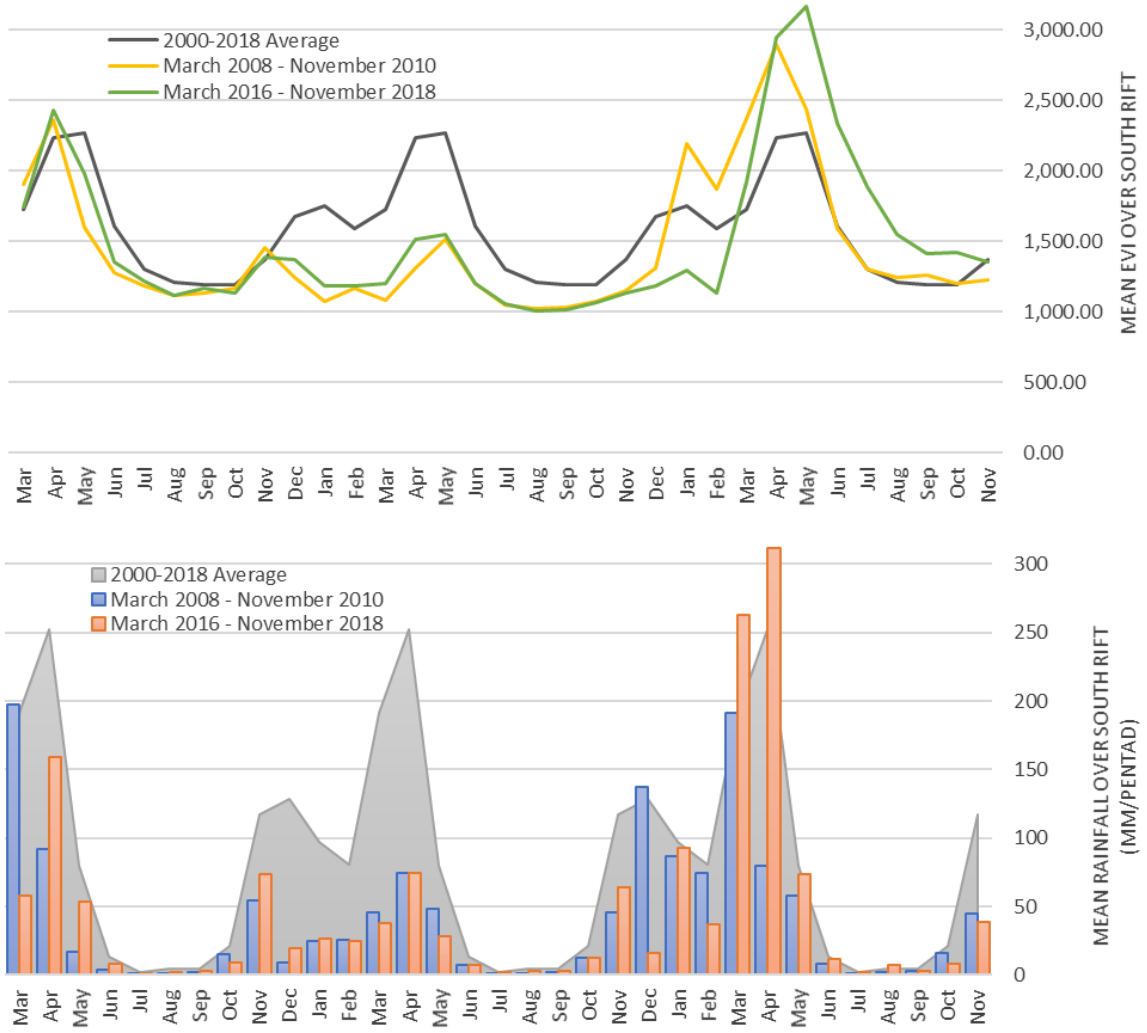

Figure A.3 Comparing monthly EVI (top) and 5-day mean (pentad) precipitation (below) data for the 2009 and 2017 droughts to the 2000-2018 average, for Olkiramatian and Shompole. Note that the significant decrease in EVI and precipitation over both the short and long rains, for each of the periods from November 2008 to November 2009, and November 2016 to November 2017. Data for EVI are from MODIS' Terra EVI 16-Day product and data for precipitation are from Climate Hazards Group InfraRed Precipitation with Station data.

Appendix B Household survey questions

Table B.1 List of questions from household survey

Questions
Start Initial
Name of Enumerator
Date Today
Start Time
Location Name
Sub-Location Name
End Initial
Start Basic Questions
Read out Introduction sheet
Are you happy to go ahead with this interview?
There is no problem if you do not wish to participate, please tell us why you have refused? Try to record reason for refusing
Language that the interview will be conducted in?
What is your name?
Read out definition of household
Are you the head of the household?
What is your relationship to the head of the Household
These questions are about the head of the household
Is the head of the household written in the group ranch register?
What is the gender of the head of the household?
What is the age of the household head?
What is the age-set of the household head?
What is the highest completed level of education of the household head?
What is the head of the household's marital status?
What is their maternal language?
Which ethnicity does the household head feel they belong to?
What are the religious beliefs of the household head?
How many sub-households are there in this household?
I will now ask about the people in this household:
How many male children from 0-16 years (below ilkiramat) are in this household?
How many female children from 0-16 years (below ilkiramat) are in this household?
How many male adults (16+ years or ilkiramat and above) are in this household?
How many female adults (16+ years or ilkiramat and above) are in this household?
How many children (male and female) are in school?
Does your household have the following? Internet Mobile Phone
Normal Mobile Phone
Radio
Torch
TV
Solar Electricity
Motorbike
Vehicle
Pit Latrine
What material have you used on the roof of your well contructed house?
What material have you used on the walls of your well contructed house?
What is the level of your household's mobility, but not during a bad drought?
End Basic Questions
Start Drought Questions
Provide prompts to allow them to recall events before and after 2009
Can you recall your circumstances during the 2009 drought when many cows from Matapato came to this area? If needed, remind them that you just described when that was
Were you the household head at that time?
Explain what we mean by actitivity

Household survey questions

Questions

Can you please rank the 3 main activities which contributed to the household's livelihood just before the 2009 drought when many cows from Matapato came to this area? 1
Just before the 2009 drought when many cows from Matapato came to this area? 2
Just before the 2009 drought when many cows from Matapato came to this area? 3
Can you please rank the 3 main activities which contributed to the household's livelihood, during the worst period of the 2009 drought when many cows from Matapato came to this area? 1
During the worst period of the 2009 drought when many cows from Matapato came to this area? 2
During the worst period of the 2009 drought when many cows from Matapato came to this area? 3
Can you please rank the 3 main activities which contributed to the household's livelihood after the 2009 drought when many cows from Matapato came to this area? 1
After the 2009 drought when many cows from Matapato came to this area? 2
After the 2009 drought when many cows from Matapato came to this area? 3
Can you please rank the 3 main activities which contributed to the household's livelihood just before the drought that just passed? 1
Just before the drought that just passed? 2
Just before the drought that just passed? 3
Can you please rank the 3 main activities which contributed to the household's livelihood, during the worst period of the drought that just passed? 1
During the worst period of the drought that just passed? 2
During the worst period of the drought that just passed? 3
Can you please rank the 3 main activities which contribute to the household's livelihood, currently 1
Currently 2
Currently 3
Over the 2009 drought period when many cows from Matapato came to this area, how often did your household skip meals due to food shortage?
What type of support did your household receive because of the drought, during the 2009 drought when many cows from Matapato came to this area?
From whom?
Over the period of the drought that just passed, how often did your household skip meals due to food shortage?
What type of support did your household receive because of the drought, during the drought that just passed?
From whom?
How often does your household skip meals due to food shortage, at the moment?
Explain the pile of stones using a scale of 1 to 10 where 1 means everything was very Bad and 10 means everything was very Good
Can you tell me how your life was, just before the 2009 drought when many cows from Matapato came to this area?
Can you tell me how your life was during the worst part of the 2009 drought when many cows from Matapato came to this area?
Can you tell me how your life was after the 2009 drought when many cows from Matapato came to this area?
Can you tell me how your life was just before the drought that just passed?
Can you tell me how your life was during the worst part of the drought that just passed?
Can you tell me how your life was when the floods came earlier this year?
Can you tell me how your life is at the moment?
Compare your household's ability to cope with drought now, and in the past

End Drought Questions

Start Livestock Questions

I will now ask you questions about changes in livestock in your household (Write 0 if they say they don't have and -99 if they say don't know)
How many livestock did your household own before the 2009 drought when many cows from Matapato came to this area? All cows, calves, breeding bulls, steers etc
Adult Sheep and Lambs
Adult Goats and Kids
Donkeys
How many livestock from your household died over the 2009 drought when many cows from Matapato came to this area? All cows, calves, breeding bulls, steers etc
Adult Sheep and Lambs
Adult Goats and Kids
Donkeys
Did you buy supplementary feed for your livestock during the 2009 drought when many cows from Matapato came to this area?
How many livestock did your household own before the drought that just passed? All cows, calves, breeding bulls, steers etc
Adult Sheep and Lambs
Adult Goats and Kids
Donkeys
How many livestock from your household died over the drought that just passed? All cows, calves, breeding bulls, steers etc
Adult Sheep and Lambs
Adult Goats and Kids

Questions

Donkeys
Did you buy supplementary feed for your livestock during the drought that just passed?
How many livestock from your household died in the rains after the drought that just passed? All cows, calves, breeding bulls, steers etc
Adult Sheep and Lambs
Adult Goats and Kids
Donkeys
Comment on accuracy
What other livestock do you have in this household?

End Livestock Questions

Begin Cultivation Questions

I will now ask you questions about cultivation:
Has your household cultivated crops in the last year, here or elsewhere?
How many acres does your household cultivate, in total?
What are the three most important crops that your household cultivates? Rank them 1
What are the three most important crops that your household cultivates? Rank them 2
What are the three most important crops that your household cultivates? Rank them 3
Does your household grow crops primarily for household use, or to sell?

End Cultivation Questions

Begin Conservation Questions

I will now ask you questions about conservation:
Does this group ranch have a conservation area?
Who owns the conservation area?
Over the 2009 drought , when many cows from Matapato came to this area, did the conservation area?
Over the drought that just passed, did the conservation area?
At the time that the conservation area was set up, did you agree with that decision?
Do you agree with the decision to have a conservation area at the moment?
Does your group ranch's grazing management system include rules about dry season reserves?
For your household, have these rules?
Do livestock from your household ever graze in the conservation area?
Does this group ranch have rules about where people can settle?
For your household, have these rules?
Do you feel your household is sufficiently informed about the use of the money the Group Ranch receive from the conservation area?
What have been the negative impacts of the conservation area?
Limits to water access
Inter-community conflict
Competition with widlife for grazing
Disease from wildlife
Income from conservation is used without transparency
Employment in conservation jobs is not assigned transparently
You can add others
What have been the positive impacts of the conservation area?
Provides employment
Money from conservation is used to support patients
Money from conservation is used to support bursaries
Increase in wildlife numbers
Gives pride in Group Ranch
Helps to conserve the environment
You can add others

End Conservation Questions

Begin Water Questions

I will now ask you questions about water use in your household:
Explain the different pictures for water source
What was the main source of drinking water for your household at the end of the drought that just passed?
How much water does your household use in a day? On average
How long does it take to fetch drinking water at the moment? To go, wait, and return, write as 00h00m
How long did it take to fetch drinking water at the end of the drought that just passed? To go, wait, and return, write as 00h00m

Household survey questions

Questions
End Water Questions
Begin Wildlife Questions
I will now ask you questions about the wildlife living here: How do you feel about the wildlife living here? Has your household experienced damage by wildlife in relation to livestock, crops or people in the last year? If livestock from your household: How many were killed by wildlife, in the last year? Cows Shoats Donkeys What is the total estimated value of the loss of livestock over the last year? Help them to calculate What animals were responsible? If crops belonging to your household were damaged in the last year, what area was damaged, in acres? What was the estimated value of the loss of crops over the last year? Help them to calculate but make sure they do only estimate the cost of crops at market and not of all input costs What animals caused damage? If people from your household were injured or killed in the last year, please briefly describe the event
End Wildlife Questions
Begin Expenditure Questions
I will now ask you to share the following household expenses: (Write 0 if they didn't have that expense) Last term school fees Purchases of livestock in the last month Veterinary costs in the last month Crop expenses in the last month Human health expenses in the last month Basic needs (food, clothes etc Transport costs in the last month Labourer and herder costs in the last month Other costs in the last month (specify)
End Expenditure Questions
Begin Participation Questions
I will now ask you questions about your participation in this group ranch: Have any members of this household held any position of leadership? Emphasize it's only their direct olmarei? Which leadership position? Select Multiple where needed In total how many years did they spend in leadership? Did you vote in your last group ranch leadership election? How much influence do you feel this household has in decision making in this group ranch? Do you agree with this statement: Women have the power to influence decisions in this group ranch How secure do you feel about the risk of theft of your household's property?
End Participation Questions
Begin Future Questions
I will now ask you questions about the future: Do you believe that your culture and traditions are important? Do you feel optimistic or pessimistic about the future of your culture and traditions? Do you believe that pastoralism is important? Do you feel optimistic or pessimistic about the future of pastoralism? To thank you for the time that you have given us, we have brought a small token of appreciation Location (GPS) Back up Location using GPS Longitude (x) Back up Location using GPS Latitude (y) For enumerator: Assessment of the interview For enumerator: Please briefly describe the small issues For enumerator: Please briefly describe the big issues Did the interview take place close to the homestead? If no, select other and explain where and why?
End Future Questions
End Time

Appendix C Changes to household survey sample

Table C.1 Households that were replaced from the samples

Population ID	From Strata	Reason	Replacement Population ID
99	Olkiramatian East	Mental disability	405
538	Olkiramatian West	Works in gov ministry and travels often	310
826	Olkiramatian West	Deaf and dumb	458
730	Olkiramatian West	Moved away	408
765	Olkiramatian West	Moved away	348
764	Olkiramatian West	Refused with no reason given	404
690	Olkiramatian West	On leave and away	579
577	Olkiramatian West	Was not there after several visits	None
2684	Shompole East	Moved away	2912
1446	Shompole East	Moved away	2635
1576	Shompole East	Moved away	2603
2861	Shompole East	Refused with no reason given	None
2604	Shompole East	Refused with no reason given	None
2573	Shompole East	Refused with no reason given	None
2158	Shompole West	Moved away	None
2396	Shompole West	Refused with no reason given. A bodaboda driver	None

Table C.2 Changes to sampling frame

Households that were sampled but were not due to be sampled		Households that were due to be sampled but were not sampled	
Sample ID	**Strata**	**Population ID**	**Strata**
217	Olkiramatian East	174	Olkiramatian East
317	Olkiramatian East	201	Olkiramatian East
410	Olkiramatian East	89	Olkiramatian East
150	Olkiramatian West	2	Olkiramatian East
404	Olkiramatian West	224	Olkiramatian East
564	Olkiramatian West	406	Olkiramatian East
27	Shompole East	693	Olkiramatian West
164	Shompole East	776	Olkiramatian West
166	Shompole East	561	Olkiramatian West
170	Shompole East	733	Olkiramatian West
175	Shompole East	812	Olkiramatian West
234	Shompole East	2570	Shompole East
247	Shompole East	1254	Shompole East
254	Shompole East	1375	Shompole East
259	Shompole East	1300	Shompole East
264	Shompole East	2410	Shompole East
430	Shompole East	1208	Shompole East
96	Shompole West	1310	Shompole East
98	Shompole West	2585	Shompole East
99	Shompole West	1403	Shompole East
196	Shompole West	2564	Shompole East
296	Shompole West	1587	Shompole East
505	Shompole West	1540	Shompole East
514	Shompole West	2904	Shompole East
568	Shompole West	2435	Shompole East
569	Shompole West	2794	Shompole East
571	Shompole West	1755	Shompole West
572	Shompole West	1810	Shompole West
576	Shompole West	1938	Shompole West
578	Shompole West	2102	Shompole West
579	Shompole West	2110	Shompole West
582	Shompole West	2152	Shompole West
583	Shompole West	2379	Shompole West
589	Shompole West	2394	Shompole West
594	Shompole West	2187	Shompole West
595	Shompole West	2023	Shompole West
596	Shompole West	2265	Shompole West
597	Shompole West	2193	Shompole West
598	Shompole West		
599	Shompole West		
600	Shompole West		
601	Shompole West		

Appendix D Interviews conducted

Table D.1 List of interviewees

Ref. No.	Details of Person Interviewed	Category	Age	*Olporror*	Location of Interview	Date	Format
I1	Chairman of Group Ranch Management Committee, Director of NGO	Current Leadership, NGO Stakeholder	46	Irkishili	Laleenok	22/11/17	SSI
I2	Former Group Ranch Management Committee Secretary, Community Liason Officer for NGO, Leader in Church	NGO stakeholder, Past Leadership	47	Irkishili	Laleenok	06/02/18	SSI
I3	Secretary of Conservation Subcommittee, Chairman of Irrigation Water Users Association, Chairman of the Board of Polytechnic	Current Leadership	45	Irmajeshi	His Homestead	17/02/18	SSI
I4	*Ilaiguenani* for Irmirishi for Olkiramatian, Shompole and Torosei	Traditional Leadership	25	Irmirishi (Irnyankulo)	His Homestead	17/02/18	SSI
I5	Community Elder	Traditional Leadership	72+	Irkisakara	His Homestead	17/02/18	OH, SSI
I6	*Ilaiguenani* for Irkishili Olkiramatian	Traditional Leadership	60+	Irkishili	His Homestead	19/02/18 and 22/05/18	OH, SSI
I7	Vice Chairman Group Ranch Management Committee, Olopolos Emanyatta Oong'udisin Irkorea Irmemiri	Current Leadership	33	Irmemiri	Laleenok	26/02/18	SSI
I8	Former Chairman of Group Ranch Management Committee	Past Leadership	72+	Irkololik	His Homestead	27/02/18	OH, SSI
I9	Farm Owner	Farm Owner	20	Irmirishi (Irnyankulo)	His Homestead	28/02/18	SSI
I10	Chairman of the Water Rights Users Association, Vice-Chairman of the Irrigation Water Users Association, Chairman of Demarcation Committee for Farm Subdivision	Current Leadership	52	Irkishili	His Homestead	01/03/18	SSI
I11	Treasurer of Olkiramatian Conservation Subcommittee, Chairman of Water for Kimelok	Current Leadership	37	Irmemiri	His Homestead	13/03/18 and 11/05/18	SSI

Interviews conducted

Ref. No.	Details of Person Interviewed	Category	Age	*Olporror*	Location of Interview	Date	Format
I12	Former Group Ranch Management Committee Chairman, Former Overall Administrative Chief	Past Leadership	80+	Irkamaniki	His Homestead	14/03/18	OH, SSI
I13	Former Councilor	Past Leadership	72+	Irkisakara	His Shop in Magadi	15/03/18	OH, SSI
I14	Former Administrative Chief, Former Group Ranch Management Committee	Traditional Leadership, Past Leadership	72+	Irkisakara	His Homestead	15/03/18	OH, SSI
I15	Community Elder	Traditional Leadership	80+	Irkamaniki	His Homestead	20/08/18	OH, SSI
I16	Community Elder	Traditional Leadership	80+	Irkamaniki	His Homestead	20/08/18	OH, SSI
I17	Former Secretary of Group Ranch Management Committee	Past Leadership		N/A	His Homestead	22/08/18	OH, SSI
I18	*Ilaiguenani* for Irmemiri Shompole	Traditional Leadership	30	Irmemiri	Lenkobei	22/08/18	SSI
I19	Chairladies of two Women's Groups	Current Leadership Female	21, 48	Irkorea and Irkishili	Lenkobei	22/08/18	SSI
I20	Chairlady of Location	Current Leadership Female		Irkishili	Her Homestead	27/08/18	SSI
I21	Member of the County Assembly, Deputy Speaker of County Assembly	Current Leadership	38	Imemiri	Near a Meeting point	27/08/18	SSI
I22	Treasurer of Conservation Subcommittee	Current Leadership	42	Irmajeshi	Lenkobei	27/08/18	SSI
I23	Chairman of Group Ranch Management Committee	Current Leadership	46	Irkishili	His Homestead	28/08/18	SSI
I24	Chairman of Cultivation, Chairman of Elders for Shompole West, Leader in Church	Current Leadership	50	Irkishili	His Homestead	29/08/18	SSI
I25	Chairman of Pakaase Waterpipe	Current Leadership Junior	41	Irmajeshi	His Homestead	29/08/18	SSI
I26	Community Elder	Past Leadership	71	Irkisakara	Pakaase Town	29/08/18	OH, SSI
I27	Secretary of Group Ranch Management Committee, Former Chairman of Group Ranch Management Committee	Current Leadership Senior	35	Irmemiri	His Homestead	29/08/18	SSI
I28	*Ilaiguenani* for Irkitoip Shompole, Leader in Church	Traditional Leadership	57	Irkitoip	His Homestead	30/08/18	SSI
I29	Chairlady of Women's Group, Leader in Church	Current Leadership Female		Irkishili	Her Homestead	30/08/18	SSI

Ref. No.	Details of Person Interviewed	Category	Age	*Olporror*	Location of Interview	Date	Format
I30	Administrative Chief	Current Leadership Senior			His Homestead	30/08/18	SSI
I31	Eco-tourism Lodge Operator	Tourism Stakeholder	36	N/A	Tourist Lodge	01/09/18	SSI
I32	Chairlady of Location	Current Leadership Female	45	Irkishili	Her Homestead	04/09/18	SSI
I33	Chairman of Conservation Subcommittee	Current Leadership Senior	26	Irmerishi (Irnyankulo)	Laleenok	06/09/18	SSI
I34	Program Director of NGO	NGO stakeholder	38	N/A	Laleenok	17/09/18	SSI
I35	Eco-tourism Lodge Operator	Tourism Stakeholder	46	N/A	Laleenok	17/09/18	SSI
I36	Program Director of NGO	NGO stakeholder	31	Irkorea	Laleenok	20/09/18	SSI
I37	*Empolasare* (sacrifiser for rain), Chairman of the school	Traditional Rain Caller	77	Irkololik	His Homestead	22/09/18	OH, SSI
I38	Chairman of Community Trust, Chairman of Conservation Subcommittee	Current Leadership Senior	28	Irkiponi (Irkorea)	His Homestead	22/09/18	SSI
I39	Former Chairman of Group Ranch Management Committee, Tourist Lodge Liason	Past Leadership	41	Irmajeshi	Lenkobei	23/09/18	SSI
I40	NGO employee, Livestock Owner	Herd Owner	30	Irmemiri	Laleenok	23/09/18	SSI
I41	NGO employee, Livestock Owner	Herd Owner	32	Irmemiri	Laleenok	24/09/18	SSI
I42	Chief Livestock Assistant for Magadi Ward, Kajiado County	County Livestock		N/A	Bar in Magadi Town	24/09/18	SSI
I43	Director of NGO	NGO stakeholder		N/A	NGO office in Nairobi	26/09/18	SSI
I44	Senior Government Warden	Current Leadership	45	N/A	KWS Headquarters	26/09/18	SSI
I45	Chairman of NGO	NGO stakeholder		N/A	His Homestead	24/01/19	SSI
R47	Research Assistants and Friends	Help to make questions relevant, verify and translate questionnaire		Various	Laleenok		RR
R48	Research Diary	Peadar Brehony				N/A	RD
R49	Research Assistant Report	Research Assistant (about his family life; history; important local events - flooding, ICIPE, Sampu burning; osotua; naming conventions)				N/A	RR
R50	Research Assistants and Friends	Mapping out area with area names		Various	Laleenok		RR

Interviews conducted

Ref. No.	Details of Person Interviewed	Category	Age	*Olporror*	Location of Interview	Date	Format
R51	Research Assistant Reports	Feedback on Pilot Household Questionnaire		Various	Laleenok		RR

Codes for Format category: SSI - Semi-Structured Interview; OH - Oral History; RR - Research Assistant Discussion or Report; RD - Research Diary

Appendix E Documents consulted and reference codes

Table E.1 List of Archival Resources

Code	Description of Resource
ACC/1994/1	Shompole Group Ranch SCIDP Shompole Wilderness Service leaflet, 1994
ACC/1994/2	Project Proposal Executive Study for the Shompole Community Integral Development Project (SCIDP) Compiled but C. Cottar, Wildlife Adviser for the SCIDP committee, 17 June 1994
ACC/1994/3	Letter written by Joseph Munge to Dr. David Western, Director of KWS for support in paying for Cottar as Advisor to SCIDP, 2 June 1994
ACC/1997/1	Lake Magadi Conservation Area Marketing Strategy and Implementation Plan. Carried out by Tack International for Ecotourism Society of Kenya and ACC, Final Draft, March 1997.
ACC/1998/1	Trust Agreement between Shompole, Olk, Oldoinyo nyokie, Olkeri to form Magadi Conservation Trust, 2 September 1998
ACC/2001/1	Article of Association for Maa Oleng, April 2001
ACC/2001/2	ACC Report to Ford Foundation on their Imbirikani and Shompole Natural Resource Management Projects, 2001
ACC/2001/3	Draft Report on the Evaluation of ACC's Community Conservation Program funded by the European Commission from July 1998 to June 2001 by Sam Mwale and Chris Thouless
ACC/2002/1	Case Study Report of Shompole Community Eco-tourism Development Project written for ACC by Joseph Munge, 2002
ACC/2002/2	Shareholders agreement between Art of Ventures and Shompole Group Ranch regarding Maa O Leng, signed on 25th January, 2002, drawn up by Inamdar and Inamdar Advocates, Nairobi.
ACC/2002/3	Declaration of Trust establishing the Shompole Community Trust, 2002
ACC/2003/1	Management Plan Framework for Shompole and Olkiramatian Group Ranches, Magadi, Kenya, August 2003
ACC/2003/2	Project Financing Agreement Between Olkiramatian GR and The Community Development Trust Fund (CDTF), 2003.
ACC/2003/3	Email from Anthony Russell to David Western cc to Amanda Mitchell, Johnson Sipitiek, James Ndungu, 2003
ACC/2003/4	Livestock Grazing in Ngare Ngiro Swamp, Shompole Group Ranch, Kajiado District, Kenya by Alyson B. Courtemanch, St. Lawrence University, ACC Intern, December 2003
ACC/2003/5	ACC Final Report to Ford Foundation for Grant No. 1030-0785 Land Livestock and Wildlife, 2003
ACC/2004/1	ACC review report of the Magadi Conservation Trust, 2004
ACC/2004/2	Progress reports to ACC head office, from the Magadi Area, 2004
ACC/2004/3	Shompole Community Trust meeting minutes, 6 November 2004
ACC/2004/4	Certificate of Registration of the Self Help Project: Olkiramatian Wildlife Conservation Group
ACC/2004/5	Proposal from ACC to Ford Foundation to set up SORALO, September 2004
ACC/2005/1	Shompole Project Implementation Committee meeting minutes, 13 January 2005
ACC/2005/2	ACC report on a project visit to Olkiramatian, 16 March 2005
ACC/2005/3	SORALO board meeting minutes, 23 March 2005
ACC/2005/4	ACC's report on Shompole Eco-tourism Development Project, from January to Nov 2005
ACC/2005/6	Opening of Olkiramatian Community Conservation Project Tented Camp Schedule Leaflet, 8 December 2005

Documents consulted and reference codes

Code	Description of Resource
ACC/2005/7	Financial Agreement between Tourism Trust Fund and SORALO, 2005
ACC/2005/9	Report by ACC of the Joint Management Planning Workshop for Shompole and Olkiramatian, organised by ACC under EU-BCP, 2005
KI/1969/1	Declaration of Adjudication Section Loodokilani in Kajiado District, 10 September 1969
KI/1970/1	Declaration of Adjudication of Shompole, 12 November 1970
KI/1974/1	Certificate of Incorporation of Olkiramatian Group Ranch, 24 October 1974
KI/1975/1	Letter from the Kenya Game Department to members of Magadi and Lower Ewaso Nyiro Area, 1975
KI/1976/1	Minutes of meeting between Olkiramatian Group Ranch Committee and Kenya Wildlife Management, 5 May 1976
KI/1977/1	Letter from World Neighbours, Portland, Oklahoma City, Oklahoma, David Cowling, to Mr Michael Kisioki and Mr Judah Munyao, 28 July 1977
KI/1978/1	Land Certificate for Olkiramatian Group Ranch, 17 January 1978
KI/1979/1	Land Certificate for Shompole Group Ranch, 23 May 1979
KI/1991/1	Ewaso Ngiro Multipurpose Project Environmental Impact Assessment Stage 1 Report, 1991
KI/1990/1	Letter from Olkirmatian Group Ranch to ICIPE, 13 November 1990
KI/1999/1	Ewaso Ngiro South Hydroelectric Project Scope of Work Pre-Feasibility Study and Environmental Assessment of Irrigating Rangeland in Olkiramatian and Shompole, June 1999 by Knight Piesold Limited, Ashford, Kent
KI/1991/1	Letter from Olkiramatian Group Ranch to Director of ICIPE, 5 April 1991
KI/1991/2	Letter from Olkiramatian Group Ranch to Director of ICIPE, 19 April 1991
KI/1991/3	Letter from Olkiramatian Group Ranch to Director of ICIPE, 28 May 1991
KI/1992/1	Letter from Olkiramatian Group Ranch to Director of ICIPE, 6 November 1992
KI/1993/1	Letter from Ministry of Lands and Housing to Olkiramatian Group Ranch, 16 April 1993
KI/1997/1	Draft letter from Maasai Rural Training Centre to Magadi Soda Company, 1997
KI/2002/1	Updated Certificate of Incorporation of Olkiramatian Group Ranch, 9 January 2002
KI/U/1	Leaflet from Magadi Soda Company to members of Olkiramatian Group Ranch
SORALO/2018/1	Olkiramatian Community Land Constitution, 2018

Appendix F Tables of development indicators

Table F.1 Household asset ownership for Kenya, Kajiado, Kajiado West, Olkiramatian and Shompole, over time. Data are from Government of Kenya (2010, 2019), and this study.

Household Asset Ownership	**Kenya**		**Kajiado**	**Kajiado West**	**Olkiramatian**	**Shompole**
	2009	**2019**	**2019**	**2019**	**2018**	**2018**
Radio	74.0%	56.9%	55.0%	54.5%	74.8%	74.2%
Television	28.0%	40.7%	51.7%	36.0%	18.9%	5.6%
Mobile Phone	63.2%	47.3%	54.6%	43.3%	93.6% (with internet 35.4%)	93.7% (with internet 26.1%)
Bicycle	25.3%	15.0%	11.9%	7.4%	N/A	N/A
Motorcycle	2.1%	9.2%	9.7%	8.5%	19.0%	18.6%
Car	4.8%	6.3%	10.9%	8.6%	2.1%	1.7%
Computer/Laptop/Tablet	N/A	8.8%	14.6%	7.3%	N/A	N/A
Torch	N/A	N/A	N/A	N/A	88.2%	96.1%
Pit Latrine	N/A	N/A	N/A	N/A	49.8%	12.0%
Solar Electricity	N/A	N/A	N/A	N/A	53.3%	24.0%

Table F.2 Household roof construction materials for Kenya, Kajiado, Olkiramatian and Shompole, over time. Data are from African Development and Economic Consultants Ltd. (1991); Coast (2001); Government of Kenya (1994, 2002, 2010, 2019), and this study.

Household Roof Materials	**Kenya**				**Kajiado**			**Olkiramatian and Shompole**		**Olkiramatian**	**Shompole**
	1989	**1999**	**2009**	**2019**	**1999**	**2009**	**2019**	**1991**	**1999**	**2018**	**2018**
Iron Sheets	52%	63%	73%	80.3%	59%	67%	69.4%	15%	8%	71.1%	23.1%
Grass/Makuti	4%	28%	17%	6.7%	13%	11%	6.3%	57%	-	13.9%	76.2%
Concrete/Cement	-	-	4%	8.2%	-	3%	13.9%	-	-	-	-
Tiles	-	-	2%	1%	-	4%	2.1%	-	-	0.4%	-
Other: dung, asbestos, canvas, nylon, cardboard	8%	9%	4%	3.7%	28%	22%	8.2%	28%	-	14.5%	0.8%

Table F.3 Household wall construction materials for Kenya, Kajiado, Olkiramatian and Shompole, over time. Data are from African Development and Economic Consultants Ltd. (1991); Coast (2001); Government of Kenya (1994, 2002, 2010, 2019), and this study.

Household Wall Materials	**Kenya**				**Kajiado**		**Olkiramatian**	**Shompole**
	1989	**1999**	**2009**	**2019**	**2009**	**2019**	**2018**	**2018**
Bricks with Cement	-	7%	7.7%	32.8%	1.2%	43.8%	15.1%	1.7%
Iron Sheets	-	-	6.6%	9.9%	37.2%	32.4%	12.1%	16.7%
Mud Bricks	12%	14%	16.8%	10.2%	6.2%	3.3%	5.1%	1.2%
Stones/Mud	-	12%	16.6%	3.5%	40.5%	1.2%	2.6%	2.9%
Wood/Mud	67%	58%	47.8%	35.2%	12.7%	15.0%	64.4%	77.1%
Grass/Makuti	-	-	3.2%	1.9%	1.3%	0.5%	0.7%	0.4%
Other	-	-	1.2%	6.6%	0.9%	3.4%	-	-

Table F.4 Level of completed formal education for Kenya, Kajiado, Olkiramatian and Shompole, over time. For 1979, 1989, 1999, 2009 "Primary" means completed Standard 5-8. For 1979, 1989, 1999, 2009 "Secondary" means completed Form 5-6. For 2009, "University" includes incomplete and complete College, incomplete and complete Undergraduate, incomplete and complete Masters/PhD. The category "Other" includes incomplete and complete Adult Basic Literacy, Technical/Vocational, or Madrassa. Data are from African Development and Economic Consultants Ltd. (1991); Coast (2001); Government of Kenya (1994, 2002, 2010, 2019), and this study.

Formal Education Completed	**Kenya**				**Kajiado**				**Kajiado West**	**Olkiramatian**	**Shompole**
	1979	**1999**	**2009**	**2019**	**1989**	**1999**	**2009**	**2019**	**2019**	**2018**	**2018**
None	51.2%	15.0%	15.7%	7.1%	33.3%	27.6%	20.2%	7.6%	8.4%	71.9%	77.7%
Pre-Primary		7.6%	6.0%	4.0%	0.0%	6.0%	6.7%	3.8%	4.3%	N/A	N/A
Primary	17.2%	23.5%	28.6%	37.9%	17.1%	17.4%	22.2%	29.9%	27.6%	12.9%	11.7%
Secondary	0.7%	0.5%	0.3%	18.7%	0.6%	0.7%	0.4%	19.7%	13.5%	9.2%	4.0%
University		0.7%	4.4%	2.6%	0.3%	1.1%	7.4%	4.4%	2.0%	3.7%	2.8%
Other	51.2%		1.2%	5.5%			0.7%	7.5%	5.5%	2.3%	3.7%
Not Stated	0.9%	3.0%	1.1%	0.1%	4.8%	2.8%	0.8%	0.3%	0.2%	N/A	N/A
Don't Know				0.2%				0.3%	0.2%	-	-

Table F.5 School attendance as a percentage of population for Kenya, Kajiado, and Kajiado West, for 2019. Data are from Government of Kenya (2019).

School attendance as a percentage of population	**Kenya**	**Kajiado**	**Kajiado West**
	2019	**2019**	**2019**
At School	37.4%	34.8%	35.5%
Left School Before Completion	14.4%	10.0%	8.1%
Left School After Completion	24.3%	28.6%	17.0%
Never Attended	15.0%	16.3%	29.0%
Don't Know	0.9%	1.2%	0.8%
Not Stated	<0.1%	<0.1%	<0.1%

Table F.6 Household sources of water for Kenya, Kajiado, Kajiado West, Olkiramatian and Shompole, over time. Data are from African Development and Economic Consultants Ltd. (1991); Government of Kenya (2010, 2019), and this study.

Source of Water	**Kenya**		**Kajiado**		**Kajiado West**	**Olkiramatian and Shompole**	**Olkiramatian**	**Shompole**
	2009	**2019**	**2009**	**2019**	**2019**	**1991**	**2018**	**2018**
Piped (yard or dwelling)	3%	24.2%	37%	18%	17.7%	13%	33.7%	-
Public Tap		9.9%		8.6%	8%		34.4%	22.8%
River/Stream/Canal	22%	16.8%	9%	5.2%	8.9%	84%	28.0%	51.8%
Spring	35%	9.5%	35%	2.8%	3.8%	2%	1.2%	0.4%
Dam/Lake/Pond	5%	4.9%	4%	3.4%	16.4%	1%	-	19.9%
Well		9.6%		2.8%	4%		-	4.6%
Borehole		9.9%		22.3%	21.6%		N/A	N/A
Bottled		2.8%		11.9%	3.6%		N/A	N/A
Rain Harvested Water	1%	3.9%	1%	1.6%	2.5%		-	0.4%
Water Vendor	7%	8.5%	14%	23.3%	13.5%		N/A	N/A
Water Tanker							2.8%	-

Appendix G All relevant information from Constitutions

Table G.1 Information from the Constitutions of Shompole and Olkiramatian Group Ranches.

	Shompole Group Ranch Constitution	**Olkiramatian Group Ranch Constitution**
Date approved	2011	2018
Zonation of Land	The Group Ranch shall be zoned into various land use areas to provide for effective management of the natural resources including but not limited to: · Grazing; · Conservation (wildlife and nature conservation and eco-tourism related development projects); · Settlement; · Pasture banking. In undertaking of the zoning process, and designating the respective land use areas, the management committee shall consult with the Group Ranch membership. The zoning process shall be a prominent component of the management plan and conservation area management plan. All members are bound to act by these zoning provisions without any exception whatsoever.	The community land shall be zoned into various land use areas to provide for effective management of the natural resources including but not limited to: · Grazing; · Conservation (wildlife and nature conservation and eco-tourism related development projects); · Settlement; · Pasture banking. In undertaking of the zoning process, and designating the respective land use areas, the management committee shall consult with the community land membership. The zoning process shall be a prominent component of the management plan and conservation area management plan. All members are bound to act by these zoning provisions without any exception whatsoever. Further to this, the Community Land is broken into two Phases: · Phase 1 - the area mainly used for irrigated agriculture · Phase 2 - land that has been specifically designated for livestock grazing in the wet season range (east of the river) and conservation of natural resources in the dry season range (west of the river).
Entitlements of Registered Members	All members are entitled to: · Reside free of charge with family and dependents; · Permit others to reside with them; · Attend, speak, be heard, and vote at annual general meetings; · Receive all publications by the GR; · Inspect and request accounts and documents of the GR; · Receive service and assistance from GR representatives; · Hold an office as representative; · Shares in the ownership of the land in undivided shares; · Use the land, water, machinery, facilities, services, and assets of the GR; · Pledge their own private property for any loan.	All members have user rights and beneficial interest of the community land. Category 1 members (Full members and individual ranch owners) are entitled to: · Reside free of charge with family and dependents; · Permit others to reside with them; · Attend, speak, be heard, and vote at all general meetings; · Inspect and request accounts and documents of the community; · Receive service and assistance from community representatives; · Hold an office as representative; · Shares in the ownership of the land in undivided shares; · Use the land, water, machinery, facilities, services, and assets of the community; · Pledge their own private property for any loan;

	Shompole Group Ranch Constitution	Olkiramatian Group Ranch Constitution
		N.B. Individual ranch holders have land as part of Phase 1 and only their own ranches in Phase 2. Category 2 members (Other forms of obtained membership including special registration as invited members and those approved on the pending member list.) are only entitled to: · Equal portion of land in Phase 1; · Equal opportunities in Phase 1; · Vote if in the community land register; · Their voice being heard. Also, the community land or interests therein may be charged as security for any loan for the purposes of developing the area, and not for any other purposes, with the approval of the community assembly, all the community representatives and the registrar of the community.
Obligations of Registered Members	Each member shall be obligated to: · Uphold the constitution; · Endeavour to participate in all activities of the GR; · Act in the best interests of the group; · Accept and comply with the decisions of the committee; · Honour any agreement entered into by the group; · Endeavour to work towards the eradication of poverty, disease and ignorance and to cooperate with others for the benefit of the group as a whole; · Inform the committee of outstanding loans granted through membership of the group; · Pay cess fees or other charges levied against them under the constitution.	Each member shall be obligated to: · Uphold the constitution; · Endeavour to participate in all activities of the community; · Be honest, loyal, trustworthy in dealings with other members, representatives and officers of the community, as well as with third parties; · Act in the best interests of the group; · Accept and comply with the decisions of the community assembly; · Honour any agreement entered into by the community; · Endeavour to work towards the eradication of poverty, disease and ignorance and to cooperate with others for the benefit of the community as a whole; · Inform the committee of outstanding loans granted through membership of the community; · Pay fees or other charges levied against them under the constitution; · Not dispose of any of the community land except with the approval of the community assembly in the presence of the community representatives and the County Registrar of Lands.
Inheritance of Shares	· A male child of a member is automatically registered as a member of the GR. · A widow will inherit her husband's share of the GR, if he was a member, and if she becomes residual household head. · If the deceased member was polygamous, the widows shall each inherit equal portion of the member's share of the GR. · If the deceased has only an unmarried female child, they will receive automatic residence and user rights.	· One inherits membership by being a member of the deceased's family. · If the deceased was polygamous, the wives shall only enjoy the rights to the resources including land that belonged to the deceased but they shall not become new members themselves neither shall they be eligible to vote. · If a member dies and has one wife or husband, they inherit the deceased's membership. · Disputes resolved by the management committee, elders, administrative leaders, or community assembly.
Election Process	Direct voting by calling of all registered members names, and queueing; the candidates who obtain a simple majority shall be deemed to have been elected.	Direct voting by calling of all registered members names, and queueing; the candidates who obtain a simple majority shall be deemed to have been elected; no voting by proxy.

	Shompole Group Ranch Constitution	**Olkiramatian Group Ranch Constitution**
	Process is presided over by the Registrar of Group Ranches.	Process is presided over by the County Registrar of community land.
Composition of Management Committee	Members elect 10 representatives, who will simultaneously serve as the Management Committee, and carry out duties and powers as given under the constitution and the Land (Group Representatives) Act. The Management Committee include: Chairperson, Vice-Chairperson, Secretary, Treasurer, and 6 others.	Members elect 15 members, who will simultaneously serve as the Management Committee, and carry out duties and powers as given under the constitution and the Community Land Act. The management committee includes: Chairperson, Vice-Chairperson, Secretary, Treasurer, and 11 others. Of these, two positions are reserved for women representatives, one position for a special need representative.
Minimum Qualifications	N/A	Two members from the Chairperson, Vice-Chairperson, Secretary, or Treasurer must have graduated Form 4.
Duties of Elected Members	· General management of the Group Ranch; · Management of incomes and revenues of the Group Ranch; · Accountable to Group Ranch members; · Guide the Group Ranch members in their planning process; · Preform duties and exercise powers as conferred by members at Annual General Meetings.	· General management of the community land; · Management of incomes and revenues of the community land; · Accountable to the membership of the community land; · Guide the community land members in their planning process; · Preform duties and exercise powers as conferred by members at the Community Assembly.
Limits to Term	Representatives shall serve for a term of 5 years, renewable only once.	Representatives shall serve for a term of 5 years, renewable only once.
Subcommittees	The Management Committee may appoint sub-committees to deal with specific issues. All committees are subordinate to the Management Committee.	The Management Committee will appoint sub-committees who will be semi-autonomous but report to the management committee. Sub-committees will include: Conservation and culture; Water and irrigation; Demarcation; Urban development; Grazing. They will develop annual plans that will be a basis for monthly reporting. If they fail to do so for three consecutive months the management committee shall summon them to show cause why, if this does not work the management committee shall call a community assembly for further action to be taken. Two members from the Chairperson, Vice-Chairperson, Secretary, or Treasurer of each subcommittee must have graduated Form 4. All committees are subordinate to the Management Committee.
Leadership Forum	N/A	The executives of the management committee; Chairpersons of the sub-committees; Age set leaders (il-aiguenak); Administrative chiefs (nkraoni); Member of the County Assembly.
Horizontal Participation	Elections of members to the committees and sub-committees shall ensure horizontal participation of members.	No member is eligible to sit in more than one committee and not more than one family member shall serve in the same committee. Elections of members to the committees and sub-committees shall ensure horizontal participation.
Meetings	Annual General Meeting: · Once a year in July with 21 days' notice; a quorum of 2/3 of all registered living members present; chaired by the registrar. Special General Meeting:	Community Assembly: · Once a year in August with 21 days' notice; a quorum of 2/3 of all registered living members present; chaired by the registrar. Special Community Assembly:

	Shompole Group Ranch Constitution	Olkiramatian Group Ranch Constitution
	· Convened at any time with 21 days' notice in exceptional circumstances; a quorum of 60% of all registered living members present; chaired by the registrar. Public Meetings: · A public meeting called to discuss issues relevant to only a particular number of the community.	· Convened at any time with 21 days' notice in exceptional circumstances; a quorum of 2/3 of all registered living members present; chaired by the registrar. Public Meetings: · A public meeting called to discuss issues relevant to only a particular number of the community.
Use of Natural Resources	Overall management of natural resources within the community land is the responsibility of the management committee, in consultation with other committees. · All natural resources found in the Group Ranch belong to the membership collectively. · Group Ranch members are entitled to utilize stones, water, minerals and sand found in the community land for domestic use only in reasonable quantities. · Charcoal burning is strictly prohibited. · In the event of a death or injury arising out of human-wildlife conflict, any member may be consoled by the Group Ranch subject to the availability of funds. · There are to be by-laws to regulate the use and cutting down of trees for building, fencing, and other purposes, and over the use of the general environment.	Overall management of natural resources within the community land is the responsibility of the management committee, in consultation with other committees. · All natural resources found in the community land belong to the membership collectively. · Community land members are entitled to utilize stones, water, minerals and sand found in the community land for domestic use only in reasonable quantities. · Charcoal burning is strictly prohibited. In extraction of natural resources, community members must be given first priority of employment, benefits, training and capacity building; there must be a clear apportionment plan to safeguard the interests of the community; the safety of the members and the environment must be guaranteed.
Contracts with Investors	When entering into contracts for the benefit of the Group Ranch, the Management Committee shall ensure that there are: · Allocations of equitable employment opportunities for Group Ranch members; · Provisions for capacity building and training; · Contributions towards the education of the children of Group Ranch members; · Manage land and livestock with sound principles of land use, management and animal husbandry.	When entering into contracts for the benefit of the community, the Management Committee shall ensure that there are: · Allocations of equitable employment opportunities for community members; · Contributions towards the education of the children of community members; · Manage land and livestock with sound principles of land use, management and animal husbandry. Contracts shall be approved by the community assembly.
Penalties and Sanctions	The Management committee are responsible for imposing penalties, in accordance with the constitution, through a disciplinary committee. A disciplinary committee will determine if penalties are to be imposed when a member is accused of the following offences. The suggested are also included: · Settlement in an area set aside for another specific use, for example a conservation area, reserve for calves, grazing area reserves as a refuge from drought etc., shall be a fine of kshs 5,000 · Using water allocated for human beings or calves, shall be a fine of kshs 5,000	The Management committee are responsible for imposing penalties, in accordance with the constitution, through a disciplinary committee. A disciplinary committee will determine if penalties are to be imposed when a member is accused of the following offences. The suggested are also included: · Settlement in an area set aside for another specific use, for example a conservation area, reserve for calves, grazing area reserves as a refuge from drought etc., shall be a fine with the amount determined by the grazing committee. · Using water allocated for human beings or calves, for any other uses, shall be a fine with the amount determined by the grazing committee.

	Shompole Group Ranch Constitution	Olkiramatian Group Ranch Constitution
	· Illegal collection of firewood, sand, stones, grass or charcoal burning dead wood, for commercial purposes, shall be a fine of kshs 20,000 and the material returned for community projects. · Dumping of any type of waste in the Group Ranch shall be dealt with in accordance with the relevant laws of Kenya e.g. NEMA, KWS, etc.	· Dumping of any type of waste in the community land shall be dealt with in accordance with the relevant laws of Kenya e.g. NEMA, KWS, etc.
Removal from Register	N/A	By personal consent or if one is unconstitutionally registered.
Subdivision	N/A	Part subdivision proposed. Consent for subdivision of Phase 1 land area has been acquired and all members whose names appear in the Olkiramatian Land register are entitled to equal portions.
Amendments	The constitution can be amended at an annual general meeting or special general meeting with a resolution passed by 60% of the members qualified to vote.	The constitution can be amended at the community assembly or special community assembly with a resolution passed by 60% of the members qualified to vote.
Dissolution	A dissolution of the Group Ranch is possible with a resolution, where at least 75% of all the members are present and voting, at a general meeting called specifically for that purpose. All members of the Group Ranch hold equal undivided shares.	A dissolution of the Community Land is possible with a resolution, where at least 75% of all the members are present and voting, at a community assembly called specifically for that purpose. All members of the community hold equal undivided shares.
Conservation Areas in a Dissolution	The conservation area shall not be subdivided. The Shompole Group Ranch shall incorporate a corporate body or trust to own said properties on behalf of the Group Ranch members.	The conservation area shall not be subdivided. The community shall incorporate a corporate body or trust to own said properties on behalf of the Community land members.